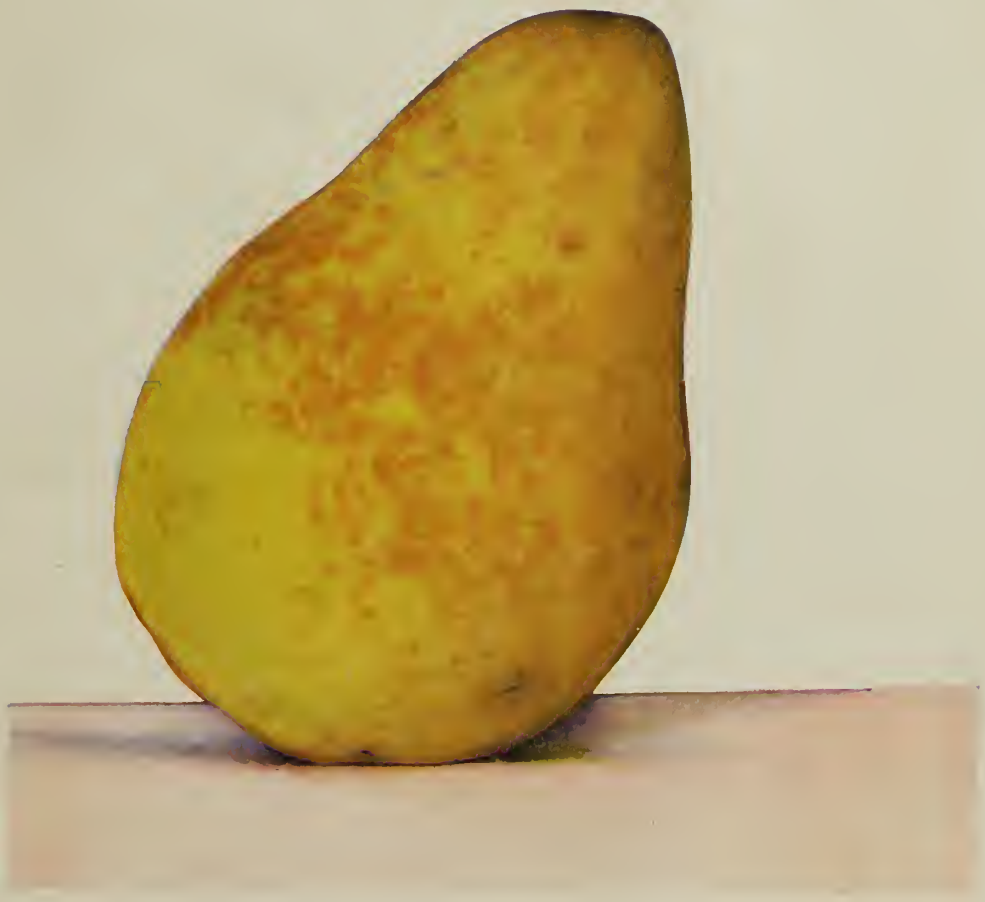
# BETTER FRUIT

VOLUME XIII APRIL, 1919 NUMBER 10





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# BETTER FRUIT

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# Apple Powdery Mildew a Serious Menace to Orchards

By D. F. Fisher, Assistant Plant Pathologist, Fruit Disease Investigation, U. S. Department of Agriculture

APPLE powdery mildew is now commonly found in all of the major apple-growing districts of the Pacific Northwest. In the hot interior irrigated districts, where it was believed fungous diseases could never thrive, powdery mildew has established itself and is now very much at home. It is hard to estimate the loss which is due to powdery mildew, since its most serious result is a general devitalization of the tree, spreading the loss over more than one season. In cases of severe infection, however, it frequently happens that more than 75 per cent of the foliage is attacked, the terminals stunted or killed, and the crop reduced more than 50 per cent. Thus far, however, its serious outbreaks have been sporadic and more or less localized. But careful observers have noted a steady spread of the disease, so that now few orchards can be found free from mildew, and it appears to be only a question of a short time before the disease will be of universal occurrence all over the Northwest. Orchardists would do well to consider the danger of this situation, for even if they find a mildewed twig only here and there these innocent appearing infections only await favorable climatic or seasonal conditions to assume a serious aspect. Climatic conditions cannot be foreseen—a serious outbreak of powdery mildew can never be exactly foretold—hence it is the part of wisdom to take no chance, but to anticipate the outbreak and combat the disease when conditions are most favorable for success. Unfortunately, growers are prone to wait until it is plain that serious damage has already been done before they become alarmed and try to "cure" the disease. But to await this condition is to invite a hard fight. By this time not only has great damage been accomplished but the fungus has become established, and instead of a comparatively easy one-year fight, the grower will find it a battle of two or more seasons to again bring his orchard to a position where mildew will not worry him. In this connection the grower should realize that the most efficient way to combat mildew is to prevent infection rather than attempt to "clean it up" after it becomes established.

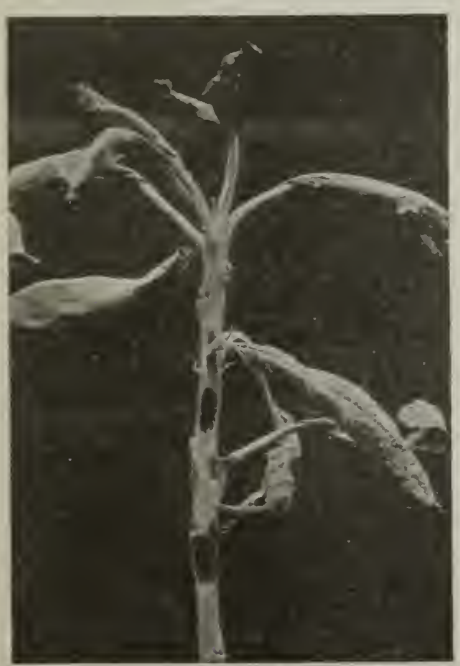

FIGURE 1—A late stage of foliage infection on watersprouts. Note that many of the leaves have been shed and that those remaining are covered with spores, and are somewhat folded. The twigs are covered with mycelium, embedded in which may be seen the dark patches of "winter spores."

Before proceeding further it would be well to consider the nature of apple powdery mildew. While it has occasionally been found on pears in the Pacific Northwest, it is most important as a disease of the apple. The disease is caused by a fungus, technically known as Podosphaera leucotricha, which grows upon the surface of leaves, twigs, blossoms and fruit. At frequent intervals the fungus mycelium (or "spawn") sends "suckers" into the surface cells of the infected parts, whereby it obtains its nourishment and devitalizes its host. It reproduces itself by means of the whitish-colored spores which are produced in such abundance on infected parts, and which give these parts their characteristic powdery appearance. These spores are produced very rapidly. They are wafted about by the wind and when lodged on tender, uninfected leaves, and the necessary moisture is present, they will start a new infection. It is in this manner that the disease is spread. The natural controlling factor is seen to be the presence or absence of moisture, since spores require moisture to germinate just the same as true seeds. Hence in rainy springs the disease is very liable to spread rapidly and assume serious proportions. In the interior irrigated districts, where natural rainfall occurs but seldom during the growing season, the dews which are of almost nightly occurrence suffice as a source of moisture supply.

Because the fungus prefers very tender growth, it is frequently found on watersprouts and terminals, and is most serious early in the season. However, if uncheeked, it will persist and spread all summer. In badly-infected orchards the whitened appearance of the trees, due to the general presence of mildew on the terminals, is a characteristic manifestation of the disease. When the infection is very severe the terminals are frequently killed. On the foliage, infection usually takes place on the under side of the leaves, where early stages are exhibited as small, white, felty patches of mycelium. The

FIGURE 2—Mildew russeting of a Black Ben Davis apple.

FIGURE 3—Mildewed blossom clusters. Note the abundance of spores over the leaves and blossoms and the deformity of the blossoms.

fungus spreads very rapidly and soon the entire leaf becomes covered and the mycelium spreads down onto the twig or spur and onto other leaves or apples that may be attached. On the fruit the fungus produces a characteristic russeting—a disfigurement that lowers the grade of the apple, and hence lowers the return of the grower. This feature of the disease is most serious on such solid-color apples as Jonathan, Grimes, Spitzenberg, Newtown and Black Ben Davis, all of which appear to be very susceptible to the disease. The russeting is not as evident on the striped varieties, of which the Stayman, Ben Davis and Rome are most suscpetible. No variety is immune, but the Winesap and White Pearmain appear to be least susceptible.

About the middle of June tiny black bodies begin to appear in the white patches of mildew on the twigs. These constitute another type of spore, which at one time doubtless served to carry the fungus over winter or other adverse growing conditions, but this function is now lost, and these "winter spores" are known to play no part in the essential life-history of the fungus. The disease is carried over from year to year by the mycelium which penetrates the buds formed on infected branches and which remains dormant with the buds until the following spring. Then, as these infected buds unfold, the meycelium resumes activity, covering the leaves and twigs and soon produces its first crop of summer spores, whereby a new cycle of infection may be started.

From these facts in the habits and life-history of the fungus it is apparent that there are two methods by which the disease may be combated: (1) by cutting out the infected twigs, and (2) by destroying the fungus as it grows. To the first there are practical difficulties which render it impossible of achievement on a commercial scale. In the experimental work at Wenatchee, Washington, reported in this article, it was found that many of the twigs bearing infected buds could be detected early in the spring, at the time the normal buds were beginning to show green. At this time the infected buds remained dormant, being delayed about ten days or two weeks behind the normal buds; too, the infected buds were more slender and elongated, with a peculiar reddish color. The persistent mycelium on the stunted twigs bearing these buds imparted a silvery appearance in the sunlight. By extremely careful work in pruning, all such twigs were removed (in the case of badly infected trees, only through the serious mutilation of the young growth, however). Later, after all the buds had opened, it was found that numerous infections still existed. These could be traced to isolated buds that had escaped detection in the very careful pruning, done with a thoroughness demanded in investigational work. From this it was apparent that pruning, as it ordinarily must be done in commercial orchards, could never be depended upon to eradicate or materially affect the disease. In subsequent spraying experiments it was shown that the careful pruning followed by proper spraying during the growing season was a valuable supplement to the spraying, and that less trouble was experienced in controlling mildew on the pruned trees. But at the same time it was apparent that, since adequate results follow a consistently adhered to spraying program, the extra time and expense involved in the very thorough cutting out of infected twigs in a badly-infected orchard is not justified from a commercial standpoint.

Where apple scab is prevalent, as in the more humid sections of the Pacific Northwest, and where it is controlled by spraying with lime-sulphur or other sulphur materials, little trouble is experienced from apple powdery mildew, since the treatment followed in controlling scab is likewise most efficient against mildew. It is in the hot interior irrigated districts, where fungicidal spraying is almost unknown, that most difficulty is experienced in controlling mildew—and where lies its greatest menace. These districts are the highly specialized and greatest prdoucing sections for apples in the West. They are the districts, therefore, in which the growers can afford to take the fewest chances, although the nature of the climate in these districts adds to the difficulty of controlling the disease.

In the experimental work at Wenatchee, Washington, it was not found difficult to restrict the spread of the disease with any one of several sulphur-spray materials, applied during the growing season (dormant sprays being ineffective), and with lime-sulphur solution good control was established. However, it was found that the use of any of the sulphur sprays during the extremely hot weather which prevails in the summer caused serious injury—burning all of the apples exposed to the direct rays of the hot midday or early-afternoon sun. This injury is doubtless brought about by the volatilization of the sulphur deposits on the fruit. It does not necessarily occur immediately after the spray is applied, but is dependent on the intensity of the sunlight. Sulphur burning of the fruit has frequently been delayed fully two weeks after the application of the sprays, and has always followed the advent of burning sunlight, which, under Wenatchee conditions was found to accompany shade temperatures ranging above 90 degrees. Hence the use of sulphur sprays should be avoided when such temperatures may be expected to prevail within a couple of weeks.

Other spray materials were tested in an endeavor to find a substitute for use

FIGURE 4—Branch from a Jonathan tree, showing a terminal spur killed by an infection of the previous year and three spurs blighted during the present season. This branch had been sprayed with lime-sulphur solution and the mildewed leaves were severely burned, while the healthy foliage was unharmed.

during the period of hot, burning sunlight. Bordeaux mixture gave rather indifferent results in fungous control and its heavy deposit on the apples prevented their normal coloring. In the rainless-summer climate of the Wenatchee Valley, Bordeaux applied in July was still present on apples picked in October. It is likely that the use of neutral Bordeaux would not result in such marked effect on the color, but this material was not used in the experimental work. Instead, ammoniacal copper carbonate was used. This material leaves no deposit on the fruit and hence does not restrict natural coloring. It gave practically as good control as Bordeaux mixture, but neither of these sprays approached the efficiency of lime-sulphur or certain other sulphur sprays.

The following spraying program, based upon the results of the Wenatchee spraying experiments during the seasons of 1915-16-17, is recommended.

The first application should consist of lime-sulphur solution, diluted 1 to 50, and should be applied when the buds are in the "pink," that is, when the individual buds are separated and just before the blossoms open. The delay of infected buds prevents an earlier spread of the disease, hence an application of fungicides at this time protects the trees through the blossoming season—during the period when the first crop of new spores is produced and scattered. If the spraying is well done and all of the new leaves thoroughly coated with lime-sulphur, spores on them will be prevented from germinating. At the same time the application of the caustic lime-sulphur spray to existing patches of mildew destroys established centers of infection. At this time, however, the foliage is expanding very rapidly and new leaves are continually being pushed out, so that complete protection is assured for a short time only. An ideal fight against mildew would consist in providing a proper spray coating to all new leaf surface as rapidly as it appears. But it is impracticable to accomplish this from a commercial standpoint.

The second application should follow as soon as the petals fall. For this spray lime-sulphur at the same dilution may be efficiently combined with lead arsenate, used for codling-moth control. A prejudice against this combination spray exists in some sections, due to an idea that the poison is rendered less effective against the codling moth and that danger of spray injury is increased. This prejudice is not warranted by the facts. The combined spray not only provides a great economy of time and effort in application where both insecticide and fungicide must be used, but it has been repeatedly demonstrated that it is more efficient than separate applications. This combination spray is in general use throughout the country where lime-sulphur and arsenate of lead are used against apple scab and codling moth. The combined spray, with lime-sulphur diluted 1 to 50, does not increase the danger of spray injury. In the Wenatchee experiments no serious injury ever developed from combining lime-sulphur and lead arsenate. Serious injury has, however, followed the combination of lead arsenate and sodium sulphur preparations put out as substitutes for lime-sulphur.

FIGURE 5—Branch from a Jonathan tree, showing a terminal killed by the infection of the previous year. Note that the petals are beginning to fall from the healthy blossoms on the lower portion, while the blossoms from the infected buds near the terminal twig are not yet open.

The first two applications described above are most important, and in any efficient program for mildew control they cannot be dispensed with. Under some conditions further spraying for mildew may not be necessary, but ordinarily at least one more application ought to be made. The time for this is about three weeks after the second application, or "calyx spray." If the spring has been rainy, and if a serious infection persists, continued spraying through the summer may be necessary. The interval betwen ths applications should not be greater than three to four weeks.

Until after the calyx spray the very efficient sulhpur sprays, especially lime-

sulphur, can be used without danger of serious spray injury or sulphur burning on the fruit. After this time, however, there is considerable risk in applying sulphur in any form. In cool seasons injury may be escaped, but cool seasons can seldom be expected in regions such as the Wenatchee, Yakima and Walla Walla districts. If subsequent spraying is necessary, and if growers are most anxious to check the disease and at the same time are willing to stand some loss of fruit on the south side of the trees, continued spraying with lime-sulphur diluted 1 to 50 will hring best results. But if fruit burning is to be avoided the grower must use other than sulphur sprays, even though they are less efficient, and take a chance on the mildew control he may establish.

The spray found best suited to this purpose in the Wenatchee experiments is ammoniacal copper carbonate, which may be prepared by dissolving five ounces of commercial copper carbonate in three pints of 25-per-cent ammonia (previously diluted in several times as much water) and finally adding to fifty gallons of water. Neutral Bordeaux mixture doubtless would prove as effective as the ammoniacal copper carbonate, and under some conditions might be cheaper. This material may be prepared by dissolving four pounds copper sulphate, or bluestone, in water for each fifty gallons of spray to be used. The bluestone is brought into solution most easily by suspending the required amount in a clean gunny-sack just beneath the surface of a measured quantity of water in a barrel and allowing it to stand for twenty-four hours.

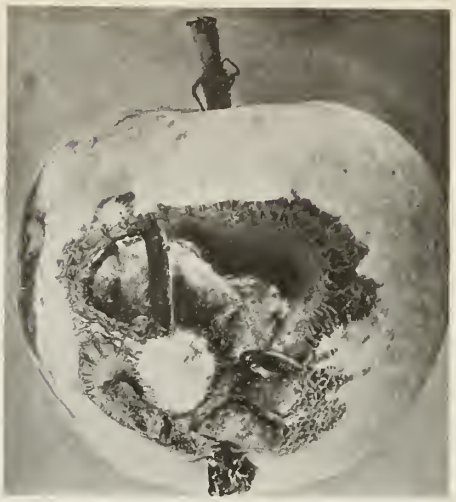

FIGURE 6—Pryor Red apple, showing sulphur injury, the type of injury which may be expected to follow applications of sulphur sprays after the advent of hot weather in the arid valleys of the Pacific Northwest.

A quantity of stone lime should be slaked in another vessel and water added to make a thin paste. When ready to spray the required amount of the bluestone solution may be added to the tank and diluted with a quantity of water. Lime water, from the stock solution above described, should then be added, the mixture being well stirred or agitated meanwhile, until the copper sulphate or bluestone solution is just neutralized. This is determined by means of a test solution prepared by dissolving a few cents' worth of potassium ferrocyanide (which may be secured at a drug store) in a bottle of water. A drop of this test solution added to the bluestone solution before the latter is neutralized produces a dark reddish-brown color. When the required amount of lime has been added no change of color occurs upon the addition of the test solution. Water should then be added to bring the spray material to the desired strength—ordinarily four pounds of copper sulphate being used for each fifty gallons of spray. Neutral Bordeaux thus prepared is similar in fungicidal properties to ordinary Bordeaux mixture (though not generally efficient over as extended a period), but without the staining effect of the latter.

It should be emphasized that no real substitute for the sulphur sprays for mildew control have been devised and that the copper sprays are merely a more costly and makeshift supplement to be used during the period of hot, burning sunlight, when sulphur sprays are unsafe to apply. The importance of early and thorough spraying with lime-sulphur during the spring, when best progress can he made, should therefore be apparent.

In spraying it is important to cover every part of the leaves and twigs, and special attention should be given to the terminals. A pressure of 200 to 250 pounds should be maintained, or sufficient to drive the spray in a fine mist through the tops of the trees. High pressure is especially important if spray materials are used which have poor spreading qualities, or a tendency to gather in drops and run off. Eddy-chamber or "whirlpool" nozzles of the "driving-mist" type should be used.

# Early Prospects for Northwest Fruit Are Promising

BELIEVING that readers of BETTER FRUIT will be interested in knowing what the early prospects for fruit in the Northwest are we are publishing a summary in this issue secured from those who are in direct touch with conditions as they exist in the various districts. The reports received indicate that the situation is very promising, although the more conservative issue a warning note that the season is early and that care and thought must be exercised to secure the maximum result. The reports are as follows:

### Yakima Situation Good

Yakima, March 30.

Better Fruit:

The prospects were never brighter for a bumper fruit crop in the Yakima valley than at present. To begin with, there has heen an ahundance of moisture throughout the winter, and officials of the U. S. Reclamation Service assert that there is ample storage water in the reservoirs and on the snow-capped slopes of the Cascades for liberal use throughout the spring and summer months. It is further stated that even should there be an unusually dry summer, storage water will be sufficient to supply the needs of orchardists and farmers throughout this section.

Last year there was produced in this valley approximately 7,000 carloads of apples, 140 cars of prunes, 2,000 cars of pears, 700 cars of peaches, 100 cars of cherries, 60 cars of strawberries, and 200 cars of mixed fruits. These, together with 325 cars of watermelons and cantaloupes, 40 cars of grapes and 5 cars of apricots, had a total valuation of slightly more than $12,000,000. Conservative estimates place the fruit crop of the Yakima valley for 1919 at 50 to 60 per cent in excess of these figures. As a matter of fact, indications now point to the largest fruit crop in the history of this valley. Some of the oldest fruit growers predict that there will be from 11,000 to 12,000 carloads of apples alone, in the proportion of about 60 per cent Winesaps, 25 per cent Jonathans and 15 per cent mixed varieties.

Spraying operations are just now being conducted on a large scale, and there is a tendency on the part of all growers to improve their orchards so as to produce only the very highest quality of fruit. As 1918 was an off year, in which the crop was only about 65 per cent normal, it is held by those best familiar with climatic and crop conditions that nothing short of damaging frosts can prevent the valley from reaching the maximum production this year.

A recent survey of orchard acreage in the Yakima valley, comprising the lands adjacent to the Yakima and Naches Rivers and those under the Tieton, Wapato, Sunnyside and Grandview irrigation projects, show that there will be a total acreage of apples in full bearing amounting to 60,000, with 2,500 acres of peaches and pears, and nearly 2,000 acres of prunes. It is estimated that there is yet to come into bearing approximately 2,500 acres of young apple orchards.

Great preparations are being made in Yakima and the nearby shipping points to provide adequate warehouse facilities to care for the coming crop. Im-

provements of this character to be made in this city will cost more than half a million dollars. As a result of the splendid prices received for last year's products, and the unusually good crop outlook for 1919, business conditions generally throughout this section were never better at this season of the year.

ORPHEUS SOOTS,
Secretary Yakima Commercial Club.

### Toppenish Hopeful

Toppenish, Wash., March 30.

Better Fruit:

Answering your inquiry of March 12th: In the orchards which I have seen recently, prospects are for a very large crop of all kinds of fruit; especially will there be an increase in the crop of peaches and some varieties of apples.

Of course, there is still a great liability of frost damage, which may reduce the prospective crop considerably. A reliable estimate of the crop cannot be made until the early part of May.

In regard to prospects for the coming crop: I have recently visited a great many points in the East, and during this trip I found that our boxed fruit has reached a great many markets, and has become established in a great many markets which have not heretofore used Northwestern boxed fruit. The Northwestern boxed fruit has generally made a profit for the Eastern purchaser. The fact that the business has been profitable, couple with these new markets, should have a great and good effect on the marketing of the 1919 crop.

I believe the principal danger which might interfere with or destroy these prospects is the fact that those growers who stored their apples this year have made tremendous profits, and this may lead some growers to attempt the same thing another year. If any large percentage of the growers had held their apples this season there would not have been the present high prices and large profits, and if any large percentage of the growers attempt to hold or gamble with their fruit next season it may be dangerous to all concerned.

On the other hand, if the growers of fruit will be satisfied to sell and ship at harvest time, at a reasonable price, I believe the prospects were never better for the marketing of a crop than they are at present.

Yours very truly,
C. W. GRANT,
Assistant General Manager
Richey & Gilbert Company.

### Spokane Reports Favorably

Spokane, March 30.

Better Fruit:

The outlook for the fruit industry in the Spokane district and the Northwest has never been better. Orchards so situated as not to be capable of producing a large quantity of high-class fruit per acre are generally being abandoned, thus reducing the apple production of the Northwest.

Growers are generally profiting by the experience of the California orange, lemon, grapefruit, raisin, almond and walnut growers, and the spirit of cooperation has never been stronger.

The opening of the export markets, occasioned by cessation of the war, will aid materially the scope of distribution. This should have a decided beneficial effect on the market in a general way, and it would seem that the fruit grower of the Northwest has before him prospects for several succeeding years of prosperity.

The grower must by persistent and by diligent efforts maintain the high standard of grade and pack, since this is the only method that can be used to successfully place the Northwestern fruit crop in the large and critical marketing centers of the East.

P. R. PARKS,
Manager Spokane Fruit Growers Co.

### Medford Optimistic

Prospects were never brighter for a big fruit crop at Medford than at the present time, says the Medford Mail-Tribune, because of the great amount of moisture in the ground, the shortening of the frost danger period by the later development of buds this year than for years, and the heavy setting of the apple and pear trees with fruit buds. Some of the most optimistic of the fruit growers are enthusiastically predicting an apple and pear crop of 2,000 cars next fall.

While County Agricultural Agent Cate agrees the prospects never appeared brighter for a large fruit crop, yet he warns not to be too optimistic about the frost outlook, and points out that May 21st last year there was a heavy frost of from 22 to 30 degrees, and April 3rd a severe frost of 18 degrees in the valley and 22 degrees in Medford. And two years ago on May 12th there was a severe frost of 26 degrees.

A prediction of 2,000 cars for the entire valley this year seems to require much optimism, as the highest previous crops of apples and pears did not approach anywhere near that number of cars.

But with the glorious prospects and abundant late moisture this year there is a thorn with the rose, as on account of the saturated ground and continued rains the orchardists are so far behind with their spraying for scale that the majority of them will abandon any further attempt at spraying this year,

and this will have a tendency to allow the scale to increase. In some of the orchards located in sticky soil in the past week or two attempts to spray resulted in the spraying apparatus being mired so fast in the mud that it was with great difficulty that the spraying wagons and horses were extricated and gotten back to the barns.

### Idaho Outlook Encouraging

Moscow, Idaho, March 19.

Better Fruit:

The outlook for the fruit industry in Idaho is very encouraging, and if present indications mean anything the fruit growers can look for a bumper crop of fruit this coming year. Fruit trees of all kinds have come through the winter in fine shape, and fruit buds and spurs are in evidence on practically all varieties. If the frost later in the season, and the "June drop," do not play havoc with the various crops, the orchardists of Idaho will have at least 5,000 cars of apples for sale and will make larger shipments of peaches, pears, prunes and cherries than any previous year. With this prospect in view the growers are taking all precautionery measures possible to protect their crops ,and are planning to follow the correct methods of spraying, pruning, irrigation, fertilization, etc.

There appears to be an optimistic feeling among the fruit growers concerning the future of the fruit industry in the state, notwithstanding the fact that they have met with reverses during the past few years, such as unsatisfactory returns, killing frosts, the European war, lack of co-operation and the reduction of the acreage from over 100,000 acres to approximately 60,000 to 70,000 acres. The following good reasons are cited by many of the growers for the eventual success of the industry: (1) A depression of the citrus industry a few years ago in California and its later recovery since the organization and perfection of the California Fruit Exchange. (2) The war has opened new markets. (3) Plantings have stopped. (4) The population is increasing faster than the new plantings. (5) Many of the old orchards in parts of the Northwest have ceased to be high producers. (6) Dissatisfied growers and non-resident owners grubbing up their orchards. (7) Federal aid has been instrumental in causing the fruit industry to take on new life. (8) The important legisalation enacted during the session of the last legislature, whereby the fruit growers will receive state protection against unscrupulous dealers. (9) Those who have been in the business for a period of years have made money, when the average for the entire period is considered.

If the industry in the Pacific Northwest is to become one of the great factors of our agricultural and commercial world, it will necessitate the closest co-operation among all the growers in the future. Furthermore, immediate legislation should be enacted, standardizing the grade and pack, if the present high prices are to be maintained. The Government believes that it is only through standardization of the products and co-operative organization that the fruit industry of the Northwest can be placed upon a good substantial basis. Co-operative organizations applied to the needs and requirements of the fruit industry as defined by one authority implies a partnership and union of interests, supported by co-operative effort and joint actions.

If co-operation and standardization, therefore, will eliminate the petty rivalry which now exists here in the Northwest, and will be instrumental in strengthening our present markets and extending new markets, let us secure it, and the sooner it is accomplished the more permanent will become our industry.

C. C. VINCENT,
Horticulturist,
University of Idaho, Moscow, Idaho.

### Advises Growers to Be Careful

Pullman, Washington, March 17.

Better Fruit:

Your letter of March 12th at hand. I fear I am not as well posted on the present condition of the fruit prospects of this state as you believe me to be. Basing my opinion, however, on comparative visits to Okanogan, Wenatchee, Kennewick and Walla Walla regions, I can say that conditions are promising. I think that I have seen the trees more heavily laden with fruit buds, but still everything is favorable for a fair crop. There has been very little winter injury, and most of the trees went into winter quarters in good condtion. There has been some injury to trees by mice in orchards planted to alfalfa or permitted to grow up to weeds. This, however, is local, but more widely distributed than one would be at first inclined to believe. The very mild winter give possibilities of some fruit-bud injury at blossoming time and for abundance of insect pests during the following summer. There is no reason to believe that the start that may be obtained by good opening prospects cannot be entirely destroyed by a bit of neglect in fighting pests long before the summer is over.

Very truly yours,
O. M. MORRIS,
Department of Horticulture,
Washington State College of Agriculture.

### Hood River Prospects Bright

The outlook for Northwestern fruits the coming season is unusually promising, according to C. W. McCullagh, manager of the Hood River Apple Growers Association, who bases his opinion upon what he saw and heard while attending the recent annual convention of the Western Fruit Jobbers' Association in Chicago.

The prospects are bright not only for apples, but for cherries and strawberries. Mr. McCullagh states in the Fruit Trade Journal that he had repeated offers for the purchase of the association's entire cherry crop at handsome figures. A prominent Chicago dealer also made an offer for several carloads of strawberries, to be sold on the Chicago market.

"We turned down the berry offer from Chicago," says Mr. McCullagh, "with the explanation that it was out of our territory. But as for our cherries, Chicago is determined to have them."

### Montana Expects Bumper Crop

Bozeman, Montana, March 20.

Better Fruit:

Prospects were never brighter for a bumper crop than they are at present. The trees set buds last summer in good

shape and the winter has been so mild that there has been no damage whatever apparent in the orchards.

The high prices that prevailed last year has encouraged the growers and the interest in fruit growing is again reviving. Many of the orchards that have been neglected, more or less, for the past few seasons are being taken care of and put in shape for profitable production.

Orchard work at this time is progressing nicely. Much of the pruning has already been done and the growers are beginning to prepare for the application of the dormant spray for blistermite and scale.

If the crop is not injured by frosts during the blooming season, Montana should market this season between four and five hundred cars of apples. The fruit produced in the home orchards and for the local markets will about equal the amount of commercial fruit.

Fruit other than apples is also looking fine. The cherry and plum crop, while not large, promises to be good.

The Bitter Root valley, the Missoula valley and the Flathead Lake region are the most important commercial fruit-producing regions in the state. There is some planting of new orchards this year, though none of the new plantings are likely to be of large proportions.

A. L. STRAUSZ,
State Horticulturist.

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**Washington Apple-Crop Prospects**

Olympia, March 20.

Better Fruit:

1918 goes down into history as being the most profitable year ever experienced by the fruit growers of Washington.

The outlook for the coming crop of Washington was never brighter than at present. The 1918 crop was not abnormal in any way. The stone fruits were injured by spring frosts so that the crop was short. These conditions, accompanied by favorable weather, permitted the trees to develop a strong, heavy setting of buds for the 1919 crop. The trees went into the winter in an ideal condition. The winter weather thus far has been very favorable, and if the blooming periods are not accompanied by frosts we have reason to expect a bumper crop of all fruits in 1919. Never in the history of the orchard development in the Northwest has Washington fruit averaged the prices that has been paid for the 1918 crop.

The state output of apples was approximately 1800 cars, which brought up to February 25 an average f.o.b. price of:

| | | |
|---|---|---|
| In Wenatchee— | | |
| Extra Fancy | $2.10 | per box |
| Fancy | 1.83 | " |
| C Grade | 1.53 | " |
| In Yakima— | | |
| Extra Fancy | $2.02 | per box |
| Fancy | 1.80 | " |
| C Grade | 1.58 | " |
| Including the four Northwest States— | | |
| Extra Fancy | $2.03 | per box |
| Fancy | 1.86 | " |
| C Grade | 1.51 | " |

Since that time the average has been, in Wenatchee, $3.09, $2.80 and $2.39; in Yakima, $2.91, $2.72 and $2.69; and today offerings of $4 are being refused. This has stimulated activities in the sale of fruit lands and some valuable transfers are being made in the leading districts. This condition has encouraged the growers to the extent that 100 Bean power sprayers have been sold in Yakima and more carloads ordered which cannot be filled by the factory. Other sections and other concerns are reporting the same conditions. The lack of thoroughness in the spraying operations of 1918 was an expensive lesson, and the growers are exerting an extra effort to get trees better pruned so that they can do a thorough job of spraying this spring, and reduce the percentage of cull apples.

M. L. DEAN,
State Horticultural Inspector.

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The cannery of the Gresham Fruit Growers' Association at Gresham, Oregon, has been leased for a term of four years by A. Rupert & Co. The pack will be principally berries, cherries, pears and vegetables.

Illustration Showing Bees in Connection with Orcharding.

# Value of Bees in Relation to Fruit Growing

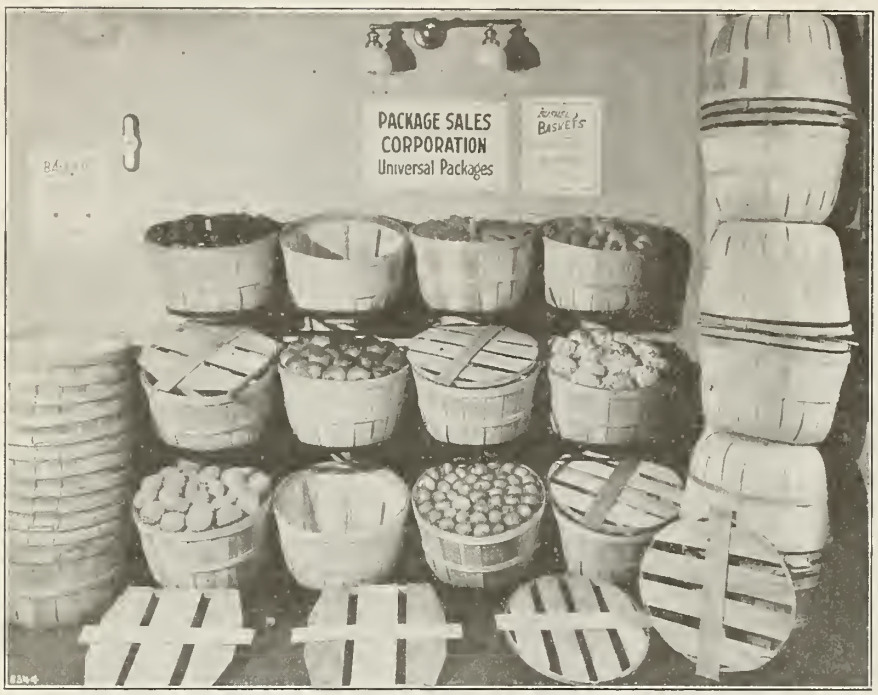
By Luke Powell, District Horticultural Inspector, Prosser, Washington

A GREAT many of our valuable fruits are sterile, or, in other words, non-productive unless they are pollenized by other fruits of the same variety. Ninety-nine per cent of the pollen is carried by the insects, and it is a safe estimate that seventy-five per cent is carried by the busy little honey bee. Thus the value of the honey bee to the fruit grower is beyond estimation, because without it many of your fruit trees would not bear sufficient crop to warrant the spraying and care of them. Not only does the bee scatter the pollen but it gathers the nectar that would otherwise go to waste and makes it into honey, which is a valuable farm product; therefore, it has a distributive as well as a productive value.

Now for a fruit grower to be a success in raising fruit he must understand the growing and care of it. The same applies to fruit growers who have bees and expect to get results from them. First study and learn all you can about caring for them. Second, don't put your bee stands out in the orchard under the trees. Why? Because it is too cool and damp for them. For bees to do good work the temperature of the hive on the inside should be about 90 degrees. The professional bee men keep their bees out where they can get plenty of good, warm, spring sunshine. The trees where the hives are are never well sprayed. The bees object and the man spraying naturally sustains the objection. There are more scale and worms on these trees than any of the others in the orchard.

Therefore, if you have your bees around under the trees, move them out at once, where they can do better work. They will scatter more pollen and increase their production of honey.

# New Departure in Handling Fruit Packages




Standard container now being used in the East for the shipment of both fruit and vegetables. The baskets contain an even bushel and the fruit or vegetable is attractively packed by having the top faced.

One of the most interesting and helpful exhibits that has ever been put before the fruit and produce trade was that of the Package Sales Corporation of South Bend, Indiana, at the recent conventions of the Western Fruit Jobbers and the American Fruit and Vegetable Growers in Chicago, says the Fruit Trade Journal. The display was in charge of E. L. Tanner. Its purpose was to demonstrate the value of the universal shipping package.

The interesting part of the exhibit was the numerous baskets filled with vegetables, showing how economical and advantageous it is to use universal packages for the shipment and marketing of fruits and vegetables. Fruits and vegetables shipped and packed in these packages promote quantity buying, which is becoming quite a habit in these days of high cost of living.

The center post of the universal bushel shipping package attracted wide attention and is the cause of a number of interesting expressions. The idea of the center post is to keep the fruits or vegetables from being crushed when one basket is placed on top of another.

The Package Sales Corporation is now issuing an interesting booklet entitled "Shipping Profits," which is of interest to fruit and vegetable growers as well as shippers.

# Outlook for the Fruit Industry in California

By L. D. Batchelor, University of California Citrus Experiment Station, Riverside, California

THE fruit and nut industry of California at present is apparently on a more stable and sound economic basis than ever before during its illustrious history. Assuming a wise choice of the natural conditions, surrounding the fruit plantation, I am of the opinion that there never has been a more promising future for the fruit and nut raiser in California than the period we are just approaching.

One of the most important factors in bringing the present industry to this high economic plane has been the organization and the successful management of the various co-operative associations for the purpose of selling the respective products. These associations have removed many of the hazards of the sale of the crop by eliminating, to a certain degree, the speculation of the middleman in the fruit growers' product. This service has been especially valuable to the producer with only a few acres, where the small volume of business made it possible to become a successful salesman.

The wide distribution and strict grading brought about by means of the co-operative associations has also been a great factor in the satisfactory sale of the fruit by the producer, as well as the ready and continual purchase of the product by the consumer. This has increased and stabilized the consumption of California fruits and nuts to a degree which the horticulturists of the past generations hardly hoped for in their fondest dreams, and, needless to say, never realized.

Another important agency in establishing a satisfactory fruit industry in California has been the successful preservation of fruits by canning, drying and the manufacturing of various fruit products. With the general markets so far from this state, the agency of successful preservation has in many cases been the most important factor in making possible the sale of vast quantities of perishable fruit. The large areas of orchards which have been planted solely to fill this market for a preserved product are among the most profitable of any in the state. Such orchards are planted without any regard whatever for the fresh-fruit markets at home, or abroad; but rather are made to include the most valuable varieties of fruit for preserving purposes, and often grown for a stipulated price, contracted for either one or several years in advance. Many of the preserving factories are now co-operatively owned by the fruit growers.

The foregoing agencies and others, such as the State and County Horticultural Commissions, the University of California Experiment Stations and the United States Department of Agriculture are all actively minimizing the producers' business risk in the production of fruit in California.

All these agencies and many others, some of which have been perfected in their successful and efficient operation in recent years, certainly give every promise of making fruit growing in California even more attractive in the future than it has been in the past.



## Report of Cold Storage Apple Holdings, March 1, 1919

United States Department of Agriculture, Bureau of Markets, Washington, D. C.

| | Storages Reporting | Barrels | Boxes | *Combined Holdings Expressed in Barrels | Comparison of Holdings on a Pct. Basis |
|---|---|---|---|---|---|
| Holdings reported March 1, 1919.. | 544 | 958,131 | 2,411,981 | 1,762,125 | .... |
| Comparison of holdings | | | | | |
| on March 1, 1918..... | 535 | 1,575,372 | 3,763,621 | 2,829,912 | 100.0 |
| and March 1, 1919..... | 535 | 952,090 | 2,399,091 | 1,751,787 | 61.9 |
| Comparison of holdings | | | | | |
| on March 1, 1917..... | 518 | 1,560,042 | 2,646,027 | 2,442,051 | 100.0 |
| and March 1, 1918..... | 518 | 1,488,437 | 3,657,063 | 2,707,458 | 110.9 |
| Comparison of holdings | | | | | |
| on December 1, 1918..... | 534 | 3,242,364 | 4,847,621 | 4,838,238 | 100.0 |
| and March 1, 1919..... | 534 | 953,473 | 2,397,778 | 1,752,732 | 36.1 |
| Comparison of holdings | | | | | |
| on December 1, 1917..... | 530 | 3,152,127 | 4,600,272 | 4,685,551 | 100.0 |
| and March 1, 1918..... | 530 | 1,487,828 | 3,509,107 | 2,657,530 | 56.7 |
| Comparison of holdings | | | | | |
| on December 1, 1916..... | 484 | 2,732,006 | 3,894,308 | 4,030,108 | 100.0 |
| and March 1, 1917..... | 484 | 1,303,234 | 2,364,235 | 2,091,312 | 51.9 |

* Three boxes to the barrel.

Summarized, this report shows a decrease of 38 per cent in the apple holdings in cold storage on March 1, 1919, as compared with those of a year ago, and a decrease of 69 per cent compared with the holdings in December, 1918.

# Building a National Market for Northwest Fruits

By David M. Botsford, Portland, Oregon

TWENTY years ago, when men first began to discover that the Pacific Northwest had the potentialities of a great fruit section, they had one ambition—to grow the best fruit in the world. These pioneers of the Northwest fruit industry went through hardships clearing the land, planting their orchards, and nursing them into full bearing.

No one questions that their ambition to grow the largest, finest apples; the most luscious peaches and pears; the most luxuriant berries, was not a thing that makes national marketing possible. As one great merchandizing man has said: "Selling and advertising are not the most important things about the product . Frankly, there is one thing more important, and that is the merit of the product."

During this generation the magnitude of the Northwest fruit industry has become a reality. The Hood River, Yakima and Wenatchee districts are growing an immense tonnage of apples. Through the care taken in planting, growing and harvesting, a large proportion of this tonnage is being shipped as fancy and extra fancy fruits.

Because of the way in which Northwestern apples are grown and marketed at long distances they must necessarily be a high grade product. Box apples cannot compete with barrel apples in the markets of the United States on anything but a quality basis.

Now, the selling end of the Northwest fruit industry, with several exceptions, has clung to older methods for disposing of their products. This method was the method "Push!" It meant a great many growers and associations pushing their product out to wholesalers, who in turn pushed it out to retailers, who offered it to the consumers. Markets were shifted each year from one section of the country to another, depending upon the competition from local grown apples.

A few of the associations and shippers in the Northwest sought newer methods for building a national market. They have taken the method of "Pull," as compared with the method of "Push." They have recognized that there are people in every community with whom quality is the first consideration. These people are being educated to buy good apples, and to buy particular brands of apples.

Among the advertising of the Northwest apples carried on there was that of the Hood River Association. In 1913 a campaign of newspaper advertising was started in Los Angeles in connection with specialty work among the retail trade. One year later, encouraged by the success in Los Angeles, the same campaign was started in San Francisco and other cities.

One interesting incident in connection with the San Francisco advertising of Hood River apples ran like this: In the opening newspaper advertisement was the telephone number of the local representative, with the suggestion that if the housewife could not obtain Hood River apples from her grocer, to telephone the representative and he would see that she would be supplied. It happened that this local representative lived at a down-town hotel, and his telephone number given was the hotel number. On the day the first advertisement appeared he dropped in at his hotel and met a demoralized condition among the telephone operators. He was handed several hundred numbers, with the courteous request that he should install a private telephone if that sort of thing was to continue.

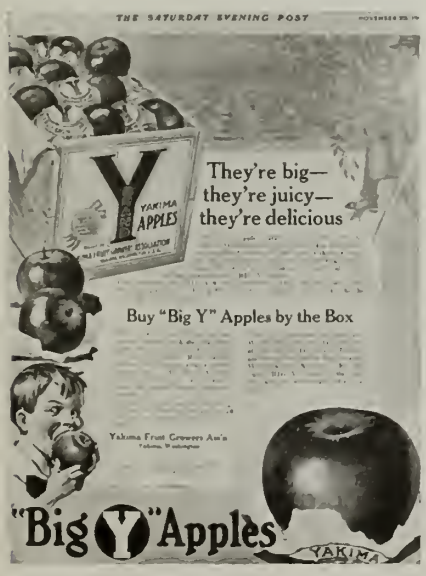
This incident shows that enough interest can be aroused with the housewife to get her to want a particular kind of apple. Such illustrations cannot but help to convince the most skeptical of us that apples can be merchandized and advertized just like any other commodity.

During the fall of 1918 the Yakima Fruit Growers' Association ran a full-page and several smaller advertisements on Big "Y" apples in the Saturday Evening Post. As a result of this they were able to extend their distribution considerably along national lines. And they received direct consumer inquiries which showed the interest of the public in the advertising of quality apples. One man, living seventy-five miles from a railroad in Nevada, ordered five boxes of Big "Y" apples sent to him.

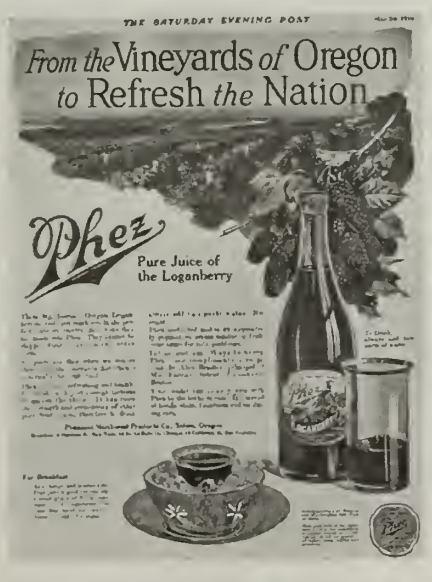
The Yakima Fruit Growers' Association are planning to gradually extend their efforts to nationalize the Big "Y" apple. As their volume and distribution grow they expect more and more fully to cash in on advertising that reaches two million people. In the meantime they are laying a foundation which will enable them to spread their tonnage over the country within reach of discriminating people who are willing to pay prices based on the merit of the product.

Probably the most striking illustration of the success of building a national market for Northwest fruit products is that of loganberry and apple juice manufacturers. Four years ago the Northwest Fruit Products Company was organized at Olympia, Washington, and Salem, Oregon, to produce and sell fruit beverages on a national scale. These products were "Loju" loganberry juice and "Applju," a sparkling, clarified apple juice. About the same time "Phez" pure juice of the loganberry was put on the market by the Pheasant Fruit Juice Company at Salem, Oregon.

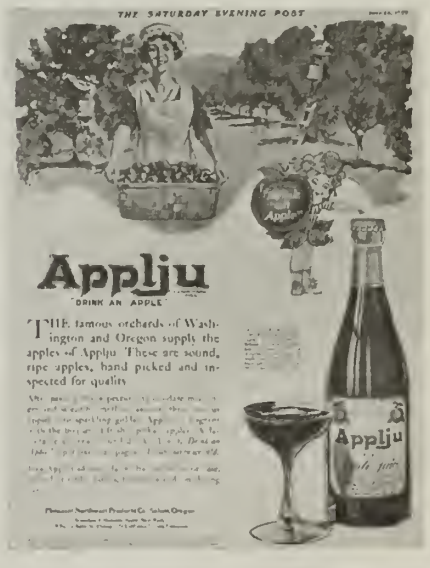
SPECIMENS OF PROGRESSIVE ADVERTISING FOR A NATION-WIDE CAMPAIGN TO PROMOTE THE SALE OF NORTHWEST FRUIT PRODUCTS




Page advertisement used in 1918 in Saturday Evening Post by the Yakima, Washington, Horticultural Union to make its fine fruit better known.




The Northwest Fruit Products Company of Salem, Oregon, will use this advertisement in the Saturday Evening Post in 1919 to make known the merits of its popular drink "Phez."




"Applju," another of the products of the Northwest Products Company of Salem, Oregon, will also be extensively advertised by this company in 1919.

On January 1, 1918, these two concerns were consolidated, forming one large company for the handling of Phez, Loju and Applju. From the gross sales of the first year, amounting to $65,000, the volume of this industry has grown until during 1920 they are planning to do a total business of $3,000,000. Today in the Willamette Valley the growing of berries is encouraged in every way possible. Where growers were plowing up their berries several years ago because of failure to obtain a market, a market of tremendous size and of constant growth upward is now firmly established.

It is more than a coincidence that this fruit juice industry from the very beginning adopted the policy of aggressive national advertising. During 1920 full-page advertisements in color will be printed in 28,000,000 copies of the Saturday Evening Post.

As an outgrowth of the fruit juice industry, the Phez Company, which is now the name of the consolidated concern at Salem, Oregon, has just completed a large jelly, jam and preserving plant which will have a capacity of several hundred carloads annually. Through this plant much of the valuable by-product of the berry will be utilized.

The prospects for the grower of small fruits, particularly in Oregon, were never so bright. Through big concerns like the Northwest Products Company a nation-wide stabilized market is being created for their products. This company alone could increase its output many times over if it was given the tonnage. With a profitable market assured them, small-fruit growers in the Willamette Valley should be encouraged to plant small fruits on a most extensive scale. In fact, with the opportunity that is now offered them they should coöperate to the fullest extent in assisting the by-products and other companies that are spending thousands of dollars in making for them such an extensive and profitable market for their fruits.

In all the history of the Northwest fruit business there never was a period so ideal for building new markets and so promising to the fruit grower as in this era following the war. America is prosperous, and has learned to pay higher prices than ever before in her history. Although prices of living must decline, they will probably never come down to a pre-war level. It presents the greatest opportunity we have ever known for the building of a market for Northwest fruits and fruit products, based upon an appeal of quality and an increased demand.

There is no strawberry grown in the world that equals the strawberry of the Pacific Northwest. This being true, our people should be growing one hundred times the quantity of this fruit that is now being produced. If we were producing our strawberries in sufficient quantities it would mean the establishment of great manufacturing plants that would work up the Pacific Northwest grown strawberry.

There is no question about the superiority of our red raspberries, our black raspberries, our loganberries, and our blackberries, but strawberries are so uniformly grown all over the United States that it is the one item in which quality is the big factor that is of greatest value to us. I cannot say too much in my enthusiasm for the future of the small fruit industry in the Northwest. All we need is to take advantage of the opportunity and develop it.

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The Hood River district has a new association, the growers of the Dee flat section having formed the West Fork Fruit Growers Club, the aim of which will be better apples and strawberries. The officers are: President, W. F. Shannon; vice-president, Mrs. W. H. Crenshaw; secretary and treasurer, C. B. Compton.

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The United Fruit Buyers' Association banquet was held in New York, March 29. The affair was held at the Waldorf-Astoria. Covers were laid for 500 and the event was a big success. The surplus from the sale of tickets was used to supply the soldiers and sailors in the base hospitals with fruit.

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The chorus of optimism for the Northwest fruit outlook is stimulating—it puts new life in every phase of the business.

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Now for a concerted effort to make the 1919 fruit crop the best ever.

# The Small Fruit Industry in the Northwest

By W. H. Paulhamus, President Puyallup and Sumner Fruit Fruit Growers' Canning Company, Puyallup, Washington

I WISH to express my confidence in the small fruit industry in the Northwest, and I trust that BETTER FRUIT will give this industry its hearty support in future. In my judgment BETTER FRUIT has been one of the best assets of the fruit industry of the Pacific Northwest. It is entirely clear in my mind that it has done as much as any one single agency in bringing to the attention of the consuming public the high quality of our Pacific Northwest apples, and I believe it can do the same thing for our small fruits.

The main thing to stimulate the growing of a much larger quantity of small fruits is a better price to the producer. For a number of years in the past the loganberry grower of the Willamette Valley and other sections of Oregon has been up against a losing proposition. Of course the loganberry was a new species of fruit, therefore it has taken considerable time to properly introduce it. The development of the loganberry juice product has been extremely helpful in increasing markets for this berry, not only for juice purposes, but for other purposes.

The great trouble with the fruit raiser is that so many of them fail to understand what it costs them to produce, with the result that buyers are constantly pinching down the price. I know of one or two canning plants that have been buying loganberries at prices that could not help but strain the grower, although the consumer would pay much more for the product if requested to do so.

I may be wrong in my vision, but the Pacific Northwest, and particularly the States of Oregon and Washington, could be doing many times the volume of business in bush fruits, provided there was an organized effort on the part of manufacturers who use this class of fruit to see that the grower secured a fair price for what he raises.

# A Spray Program for the Northwest Apple Orchards

By Leroy Childs, Entomologist and Plant Pathologist, Hood River Experiment Station

[Editor's Note—At the request of many orchardists throughout the Northwest we are again publishing this spray program which appeared in the April, 1918, issue of BETTER FRUIT.]

THE accompanying spray calendar is so arranged that it will adequately cover the needs of the orchardist in most of the apple-growing sections of the Pacific Northwest. It must be understood that this is not a blanket recommendation, for there are indeed but few localities that would demand all of these applications of spray listed in order to effect control of the different apple pests. The orchardist must determine, first, the pests that must be controlled in his orchard, and secondly in his procedure, with the assistance of his local adviser, determine whether seasonal conditions warrant the alterations of the program. The calendar presented is arranged to meet maximum adversities from the standpoint of weather conditions and pest development, with a result that during many seasons decided alterations may be necessary. In the alteration of these arranged sprays the advice of an expert orchard investigator should be obtained if possible.

Seasonal development is the most important factor in making the necessary alterations in any spray schedule. Usually a late spring is a decided advantage to the orchardist from the standpoint of the number of sprays that will be necessary during the season. This is especially true in the control of apple scab. In order to completely protect the orchard from the disease it is necessary to keep the foliage protected from the delayed dormant stage until the spring rains are over. Under the conditions which exist at Hood River rains can be expected until about the first of July. Two applications a month are necessary to keep the foliage and developing fruits coated, so that if the delayed dormant stage is reached by April 1, which often happens, it would be necessary to make five applications of a fungicide in order to obtain complete protection. If, on account of delayed plant development, this is applied April 15, four applications will be effective, and should this be delayed until May 1, as was the case in Hood River in 1917, three applications in many cases gave excellent results.

### Discussions of Different Applications

In connection with the different applications given in the calendar there are a few important factors that should be discussed somewhat at length; lack of space prevents this in the tables. For the sake of clearness, a discussion of each application follows, the paragraph number corresponding with the spray number given in the calendar.

**1. Dormant Spray.** The oil application is a dormant spray and is only advised in orchards where the leaf roller is present. When used for this insect it is incidentally effective in controlling both San Jose scale and brown aphis. However, under Northwestern conditions, rains following the application of spray within three to five days, its effectiveness is greatly reduced. Warm, settled weather conditions are absolutely essential to insure the leaf roller eggs being destroyed by the oil. The best results have been obtained by waiting until the buds are well swollen and the tips of the first leaves are just beginning to show. For the control of San Jose scale and oyster shell scale lime-sulphur used 1-8 will be found less expensive and more effective, provided rainy weather follows the application. If the lime-sulphur is used as an early dormant application (before the buds swell) use Black Leaf for brown aphis control in Spray No. 2.

**2. Delayed Dormant Spray.** The delayed dormant spray is primarily a scab spray. Protection is needed at this time as spores of the fungus are being discharged in large numbers from the old fallen leaves. In orchards where the brown aphis is troublesome (the insect which causes the small, knotty clusters of apples), tobacco (nicotine sulphate) 1-1200 should be added. Compared with past years, we have made a reduction in the strength of lime-sulphur to be used, and further experimental evidence will probably permit the making of greater dilutions for this application. In orchards where lime and sulphur has been regularly used in the control of apple scab for several years, mildew is incidentally kept in check by this fungicide. The trouble is usually more pronounced in young unsprayed orchards or in sections where lime-sulphur has not been extensively employed. In orchards where the disease is prevalent it can be more specially brought under control by adding iron sulphide mixture 10-100 to the lime-sulphur. The fungus which causes powdery mildew begins activities as soon as the foliage appears in the spring, and demands the same attention in controlling it as does apple scab.

**3. Pink Spray.** The pink spray is employed chiefly for the control of apple

## Spray Program for Northwest Apple Orchards

| *Application* | *Insect and Plant Disease* | *Material and Time of Application* |
|---|---|---|
| 1. Dormant Spray. | Leaf roller<br>Brown aphis.<br>San Jose scale.<br>Oyster shell scale. | For the leaf roller, miscible oil, 6 to 100.<br>Use only in orchards where leaf roller control is desired or where San Jose scale is serious. Apply as late as possible in the spring, under warm, settled weather conditions.<br>(See discussion for Spray 1.) |
| 2. Delayed Dormant Spray. | Apple scab<br>Apple mildew<br>Brown aphis | For scab, lime-sulphur 32°, 1 to 25.*<br>For mildew, add iron sulphide mixture, 10 to 100.<br>For brown aphis, add tobacco (nicotine sulphate) 1 to 1200. Apply at time the first leaves are unfolding about the bud clusters on the fruit spurs.<br>(See discussion for Spray 2.) |
| 3. Pink Spray. | Apple scab<br>Mildew<br>Bud moth | For scab, lime-sulphur 32°, 1 to 30.<br>For mildew, add iron sulphide mixture, 10 to 100.<br>For bud moth, add arsenate of lead, 4 to 100 (powder 2 to 100). Do not apply until the fruit buds stand separated in the clusters (Figure 2).<br>(See discussion for Spray 3.) |
| 4. Calyx Spray. | Apple scab<br>Mildew<br>Codling moth | For scab, lime-sulphur 32°, 1 to 35.<br>For mildew, add iron sulphide, 10 to 100.<br>For codling moth, add arsenate of lead, 4 to 100. Apply as soon as petals fall.<br>(See discussion for Spray 4.) |
| 5. Ten-Day Spray. | Apple scab<br>Mildew | For scab, lime-sulphur 32°, 1 to 40.<br>For mildew, add iron sulphide mixture, 10 to 100. Apply 10 to 15 days following calyx application. (See discussion for Spray 5.) |
| 6. Thirty-Day Spray. | Apple scab<br>Codling moth (if present)<br>Green aphis<br>Woolly aphis | For scab, lime-sulphur 32°, 1 to 50; or self-boiled lime-sulphur, 6-6-50.†<br>For codling moth, add arsenate of lead, 4 to 100.<br>For green and woolly aphis, add tobacco, 1 to 1200. Apply 30 days following the calyx application. (See discussion for Spray 6.) |
| 7. July Spray. | (Advisable in certain sections for)<br>Codling moth<br>Green aphis<br>Woolly aphis | For codling moth, add arsenate of lead, 4 to 100.<br>For green and woolly aphis, add tobacco, 1 to 1200. In applying this spray consult with your nearest expert. (See discussion for Spray 7.) |
| 8. Third Codling Moth Spray. | Codling moth<br>Anthracnose<br>Late scab<br>Woolly aphis | For codling moth, add arsenate of lead, 4 to 100.<br>For anthracnose and late scab, add bordeaux mixture, 3-4-50.‡<br>For woolly aphis, add tobacco, 1 to 1200.<br>Date of application can only be told by seasonal development of codling moth through breeding cage studies. Get in touch with nearest entomological investigator. (See discussion for Spray 8.) |
| 9. Fall Spray. | Anthracnose | For anthracnose, bordeaux mixture, 6-6-50. Apply as soon as fruit is harvested. |

* If lime-sulphur does not test 32°, see accompanying table for the proper dilution.
† Write Oregon Agricultural College for particulars in the preparation of self-boiled lime-sulphur.
‡ Three pounds bluestone, four pounds lime, fifty gallons water.

scab. In sections where the bud moth is present arsenate of lead used in the standard dilutions should be added to the lime-sulphur. Owing to the fact that the entire developing apple cannot be completely covered with spray, and thereby given complete protection, until the young fruits have separated in the clusters, this spray should be delayed until they sufficiently develop. In large orchards, however, it will not be possible to wait until all of the spurs are in this condition. The orchardist should arrange his spraying so that the greatest proportion of the crop is sprayed while in this condition. If mildew is severe add the iron sulphide mixture.

4. **Calyx Spray.** All orchardists are familiar with the value of applying arsenate of lead at this period in the devolpment of the young apple. Apply the spray a few days following the dropping of the petals. Owing to the fact that it is nècessary to protect the fruit from further scab infection, lime-sulphur must be used. In orchards where mildew control is a problem, continue the use of the iron sulphide mixture.

5. **Ten-Day Spray.** The so-called ten-day or two-weeks spray is primarily used for furthering scab protection. It is through the use of this application and the following one that "shot fungus" or the appearance of numerous scab spots on the fruit, usually early in July, is prevented. It is a very important spray during most seasons and must not be omitted.

6. **Thirty-Day Spray.** This application is made just previous to the hatching of the first brood of codling moth and is therefore a very important application. During certain seasons it is necessary to use a spray in order to prevent further scab development. The use of lime-sulphur is dangerous at this time, due to the possibility of burning, and before using it consult with the nearest investigator. We have been experimenting for two seasons with self-boiled lime-sulphur in this application and the preceding, and the results that have been obtained are very encouraging. Scab control has resulted with practically no fruit burn. The greatest difficulty so far encountered is that of preparation. Both the lime and the sulphur must be of good quality or the resulting product will contain many fine particles which clog up the nozzle. The work which is to be continued along this line during the coming season will clear up many of the difficulties so far encountered in the use of self-boiled lime-sulphur. For the preparation of this material write the Oregon Agricultural College, Corvallis.

7. **July Spray.** This application is needed in some sections of the state for the control of codling moth. Keep in touch with your fruit inspector or investigator. At Hood River and most of the interior apple districts the hatching of the second brood of worms does not take place until August. During some seasons the green and woolly aphids become injurious during this month. Watch them closely and if they become injurious spray.

8. **August Spray.** In many sections of the Northwest the lead spray for the control of the second brood of codling moth must be applied during this month. The exact date can only be determined by carefully conducted breeding observations, carried on by one familiar with the insect's activities. If your section is badly infested with worms, get an expert to carry on some breeding studies. To be effective during the time the eggs are hatching the spray must be applied at a time not to exceed a few days before the hatching of the first eggs, or the spray will lose its effectiveness before the later eggs are hatched. A lead spray at this time of the year is entirely effective for a period not to exceed 21 to 25 days. If an application, therefore, is applied a couple of weeks before the eggs begin to hatch its extended effectiveness is greatly reduced. During some seasons eggs continue to hatch for a month or more, with a result that it is very essential to put the spray on at just about the right time. Bordeaux 3-4-50 can be added to the arsenate of lead. This, however, is only advised in orchards where anthracnose is causing considerable damage. Bordeaux has a tendency to mottle red apples, due to the fact that the sunlight is prevented from reaching the surface of the fruit and the apples do not color uniformly.

9. **Fall Spray.** For the control of anthracnose the fall application of bordeaux mixture should immediately follow the harvesting of the fruit. If this disease is once put under complete control in a given district, spraying every other year thereafter has been found sufficient in the Hood River sections to keep the trouble in check. This would probably be true of the activities of the disease in other sections. Spores become active followni the early fall rains, and to get complete control the application should be made before these occur.

DILUTION TABLE FOR LIME-SULPHUR AT DIFFERENT DEGREES BEAUME *

(This table is prepared considering lime-sulphur at 32° Beaume as standard. Concentrates testing higher or lower are arranged so that they will contain the same amount of sulphur in the diluted spray.)

| *Degrees Beaume* | *Delayed Dormant Spray* | *Pink Spray* | *Calyx Spray* | *Ten-Day Spray* | *Thirty-Day Spray* |
|---|---|---|---|---|---|
| 36 | 1 to 28.3 | 1 to 34.1 | 1 to 40.0 | 1 to 45.6 | 1 to 57.4 |
| 35 | 1 to 27.5 | 1 to 33.1 | 1 to 38.8 | 1 to 44.2 | 1 to 55.6 |
| 34 | 1 to 26.7 | 1 to 32.1 | 1 to 37.5 | 1 to 42.8 | 1 to 53.7 |
| 33 | 1 to 25.8 | 1 to 31.0 | 1 to 36.2 | 1 to 41.3 | 1 to 51.9 |
| **32** | **1 to 25.0** | **1 to 30.0** | **1 to 35.0** | **1 to 40.0** | **1 to 50.0** |
| 31 | 1 to 24.2 | 1 to 28.9 | 1 to 33.7 | 1 to 38.6 | 1 to 48.2 |
| 30 | 1 to 23.3 | 1 to 27.8 | 1 to 32.3 | 1 to 37.1 | 1 to 46.4 |
| 29 | 1 to 22.5 | 1 to 26.7 | 1 to 31.0 | 1 to 35.6 | 1 to 44.5 |
| 28 | 1 to 21.6 | 1 to 25.7 | 1 to 29.7 | 1 to 34.2 | 1 to 42.7 |
| 27 | 1 to 20.8 | 1 to 24.5 | 1 to 28.3 | 1 to 32.8 | 1 to 41.0 |
| 26 | 1 to 20.0 | 1 to 23.5 | 1 to 27.0 | 1 to 31.3 | 1 to 39.0 |
| 25 | 1 to 19.1 | 1 to 22.4 | 1 to 25.7 | 1 to 30.0 | 1 to 37.2 |
| 24 | 1 to 18.3 | 1 to 21.3 | 1 to 24.3 | 1 to 28.7 | 1 to 35.4 |
| 23 | 1 to 17.4 | 1 to 20.2 | 1 to 23.0 | 1 to 27.2 | 1 to 33.5 |
| 22 | 1 to 16.5 | 1 to 19.0 | 1 to 21.6 | 1 to 25.8 | 1 to 31.7 |
| 21 | 1 to 15.8 | 1 to 18.1 | 1 to 20.3 | 1 to 24.5 | 1 to 30.0 |
| 20 | 1 to 15.0 | 1 to 17.0 | 1 to 19.0 | 1 to 23.0 | 1 to 28.2 |

* This table was kindly prepared by Mr. R. H. Robinson, Assistant Chemist, Oregon Experiment Station.

# Development of the Northwest Fruit Industry

By W. S. Thornber, Director Extension Service State College of Washington, Pullman, Wash.

THE fruit-growing industry of the Pacific Northwest is gradually coming back to its normal condition and will soon again take a very important place in the agriculture of the Pacific Northwest. Like all branches of agriculture, fruit growing has had to experience a period of comparatively small activity and development, and with the close of the war and the desire of men to return to agricultural pursuits more interest has been shown in the development of the fruit interests of the Pacific Northwest during the past three or four months than has been apparent in the past three years.

Those familiar with the importance of the industry realize that with the millions of dollars invested in this industry the opportunities for development by increased acreage and the possibilities of favorable climate, soil and conditions for the production of fruit, the industry will gradually assume a very important phase in the agriculture of the Northwest. Thousands of acres of orchard have been neglected or pulled out not only in the East, but as well here in the Northwest during the past three years. People are again beginning to demand more fruit in the diet and it is very evident that this will tend to make the industry not only an important but a good, substantial fundamental branch of our Western activities.

Owners of orchards and operators should not misunderstand this activity and feel that any kind of land will bring good returns, because only on land planted to proper varieties in districts where fruit production is favorable can it be made a success worthy of consideration. Lands planted to unsuitable kinds or varieties in districts where fruit is uncertain should be converted into alfalfa, corn, sugar-beets or other farm crop land and great care should be exercised in the planting of new districts to see that only those districts which have all the factors necessary for success be largely devoted to fruit growing.

During the past twelve or fourteen years, the industry has developed from that of a pure apple industry to diversified horticulture, and now in the Pacific Northwest are included European and American grape plantations, cherry orchards, peach orchards, pear orchards and small fruits like strawberries, loganberries, blackberries, raspberries and currants, and even the culture of nuts, including almonds, filberts and English walnuts.

It is my opinion that there will be greater development in the fruit industry during the next four or five years than in any other single branch of agriculture.

### A COMING FRUIT DISTRICT

Robert Paulus of the Salem Fruit Union gave The Chicago Packer man some interesting facts when calling there a few days ago. According to Mr. Paulus the apple acreage of the Willamette and Umpqua valleys coming into bearing this coming season will be more than 10,000 acres. Last season the output of dried prunes was between 58,000,000 and 59,000,000 pounds. This includes the output of Clarke County, Washington, the Washington prune district just across the Columbia River from Portland. One hundred cars of apples were shipped from these two valleys mentioned above and should increase to 2,000 cars within the next two or three years.

# Does Fruit Tree Spray Injure or Kill Bees

From the American Bee Journal

SEVERAL letters have come to my desk of late, says the editor of the American Bee Journal, which have to do with the poisoning of bees from the spraying of fruit trees while in bloom. In New Mexico it seems that a bill is pending in the legislature which provides a penalty for the application of spray poisons to the fruit trees before 90 per cent of the blossoms have fallen. A few states have passed similar laws and several others, after considering such measures, have refused to enact them.

At one time I used my influence for the passage of such a bill in Iowa, although I must confess that I was not enthusiastically in favor of it. Since that time I have investigated the matter somewhat and now doubt whether such laws are desirable. Here in America we have come to look upon "laws" as the cure for every ill. Every day we hear somebody say that there should be a law passed prohibiting this or that. Perhaps we will learn in time that the mere passage of a law does not always remedy our troubles.

In the case of spraying, so many beekeepers report the loss of bees from the spraying of fruit trees while in bloom that there must be some cause for complaint. However, it seems to me, after looking into the thing, that a law is not the proper remedy . In the first place, the passage of such a law is resented by the fruit growers as being aimed especially at them. Instead of developing harmonious action it has the opposite effect. The interests of the fruit grower and of the beekeeper are mutual. It is recognized that bees are necessary to insure proper pollenization of fruit blossoms. It is also taught by most entomologists and horticulturists that the best time to spray is after the petals have fallen. Not only may the bees be poisoned, but the fertilization of the blossoms may be retarded or to some extent prevented by spraying before that time.

This being the case, what we need is not a law punishing the man who reduees his own crop and kills his neighbor's bees by improper spraying, but an educational campaign to give proper instruction in the application of the poison.

The fruit growers are as anxious to teach the mass of small orchardists to use spraying materials as the beekeepers are to induce every bee man to treat foulbrood. The enactment of a law prohibiting spraying at any time may easily discourage its being done at all. In this case the fruit business has been injured.

There are few fruit growers, progressive enough to spray their fruit trees, who will be purposely disposed to injure the bees on which they are dependent as an agency in the fertilization of their fruit. Instead of trying to force through a law against spraying while the trees are in bloom, the bee men and fruit growers should meet and agree upon a campaign of education in districts where spraying is improperly done. Such a campaign will result in great benefit to both the fruit grower and the beekeeper, and should leave both with the best of feelings toward each other.

When, as sometimes happens, the legislative committees ask for definite proof of the injury to bees from this cause, the beekeepers find it difficult to prove their case. Our senior editor once served as a member of an Illinois delegation to appear in behalf of such a measure. The chairman of the legislative committee was an extensive orchardist, who seemed disposed to be very fair in the matter . He asked for proof of injury to the beekeeper, and when an attempt was made to furnish specific cases whieh could be laid to this cause the beekeepers were unable to find them. We are a little in the dark as to just how much the bees are injured from this cause and here is a place where our experiment stations can render some real service to both fruit growers and beekeepers by making extensive and eareful tests as to the extent of the injury, the time when bees are poisoned, and also in searching for a remedy. Judge Taylor, of Yakima, Washington, suggests that since the arsenate of lead is said to be sweet, the bees may be attracted to it at times when the trees are not in bloom. He also suggests the possibility of adding to the spray some repellant which is obnoxious to the bees, and thus prevent them from taking it at any time.

From Washington comes the report that the greatest loss is not at the time when the trees are in full bloom, but during the subsequent spraying for the second and third broods of codling moth. The injury seems to be worse in dry sections, where water is not easily available, which indicates that the bees in seareh of water for brood rearing at times suck up the newly applied poison. Until we have more definite information on which to base our demands for legal protection, let us appeal for help to the extension departments of our agricultural colleges in spreading information and to the experiment stations to ascertain true conditions.

## Sends Fruit Man to Europe

Apple growers throughout the Northwest will be keenly interested to learn of the forward step taken by the association at Hood River, Oregon.

This organization was among the very first to recognize the opportunity for growth and expansion of its distribution through intelligent European trade connections.

Now that conditions are rapidly becoming normal, Sales Manager McCullagh recommended to the board of directors of the association that Dwight L. Woodruff, their New York district manager, visit the United Kingdom, France, Belgium, Norway, Sweden, Denmark and, if advisable, other European countries, with instructions to carefully study trade conditions and obtain first hand information as to undeveloped business possibilities.

Mr. Woodruff left New York late in March, expecting to be away from America until about July 1. On his return BETTER FRUIT hopes to furnish its readers with a synopsis report covering this extended trip, whieh we feel sure will be of unusual benefit to the apple industry.

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### Early Prospects for Fruit.

Reports on the early prospects for the Northwest fruit crop are optimistic. For the first time in several years the fruit grower, the expert in horticulture and the fruit shipper of the Pacific Northwest and the fruitmen of California also are hopeful. This new beam of sunlight in the fruit-growing industry is due somewhat to the success attained last year but not altogether. Fruitmen generally are now feeling that the fruit industry has been more nearly stabilized and standardized and that new markets at home and abroad promise a much greater consumption. The favorable wintering of all fruits is also a factor.

While the optimistic tone of the outlook for fruit crops in 1919 more particularly applies to orchard products, there seems to a be a general feeling among all fruitmen that the coming season should be a good one. From Oregon, Washington, Idaho and California come reports containing great expectations. In presenting these interesting reports to its readers Better Fruit takes occasion to warn them that the season is yet young and that many things may occur to cut down the expected output considerably. The course of the Northwest fruit grower, therefore, should be to bend every energy toward guarding against all contingencies as far as possible. The success attained last year and the promising outlook for 1919 should be the signal for renewed effort instead of a let-down due to over-optimism caused by the splendid prospects for the fruit industry during the coming season. Retain your optimism but let your watchword be "Efficiency," with a big E.

### Future Apple Production.

A tree census just completed in the State of Washington shows a marked reduction in the acreage of fruit trees since the last census was taken in 1915. The greatest reduction according to the census is shown in peach trees, which in some districts have declined in numbers 50 per cent. While figures for apple trees do not show such a startling decline, still the reduction throughout the state runs into a large total. In four of the large fruit-growing counties in Washington the loss is given as 7,000 acres. In these same counties the number of apple trees has declined from 2,678,172 in 1915 to 2,288,490 in 1918.

Oregon, Idaho and Utah do not show such large losses in apple acreage as Washington, but the number of trees that have been eliminated runs into thousands of acres. For the past three years the planting of new apple orchards in the Northwest has practically ceased and although a considerable acreage of apples will come into bearing in the next few years it will be a negligible quantity as compared to that which has been uprooted.

The world war has also resulted in the loss of an enormous number of fruit trees. In France alone the destruction of apple and pear orchards has been enormous, and it will be many years before these orchards can be replanted and brought to the stage of productivity that existed previous to the war. What is true of France in respect to its fruit production is also true in all the other foreign countries which were overrun by battling armies. These countries will need fruit, and the only nation that can largely supply it is the United States.

The cause of the diminution in apple acreage in the Northwest has of course been due to the planting of orchards in sections where neither the climate or soil was adapted to their successful propagation, and also to bad market conditions, during a period of several years previous to 1917 and 1918. With these facts and figures in mind it would seem that the "overproduction fear" which harassed the apple grower for several years has to a large extent been eliminated. Over-optimistic orchardists and promoters of apple lands to be sold regardless of their productive qualities have learned their lesson. Increase in orchard acreage in future will be studied carefully with a view to supplying actual demand instead of exceeding it.

### Apple Powdery Mildew.

Although not a new apple-tree disease apple powdery mildew is now assuming such proportions in some of the Pacific Northwest fruit-growing districts that it is becoming recognized as being as serious as scab, anthracnose and other more common diseases that the apple tree is heir to. Its most serious result is a general devitalization of the tree with a consequent lowering of output and the production of inferior fruit. Better Fruit, through the courtesy of D. F. Fisher, Assistant Pathologist of Fruit Tree Investigations of the U. S. Department of Agriculture, presents in this issue a very able article on this subject—one of the first to be published. As Mr. Fisher not only describes the general symptoms of the disease in detail, but also prescribes a remedy, apple growers where it is found to exist should be enabled to combat its ravages in the early stages, the most effective time to fight fruit-tree diseases of any character.

### The New Remedy for Pear Blight.

In discovering that cyanide of mercury apparently is an effective remedy for pear blight F. C. Reimer has given the fruit grower a boon of incalculable value. Heretofore the only known remedy for blight was to use the knife so freely that in many instances the trees were ruined, or if very badly infected had to be cut down and burned. Of all the tree diseases pear blight is perhaps the most infectious and the most deadly, the germ even clinging to the tools used in cutting and frequently transmitting the disease to trees that were sound or only slightly affected. After experimenting with various disinfectants Mr. Reimer tried cyanide of mercury. The results have been so beneficial that they should lead growers in pear blight infected districts to become extremely hopeful of eradicating this fatal tree disease.

### The Small-Fruit Grower.

While apple growing has occupied the center of the stage in the fruit producing industry of the Northwest for some years, owing to the big tonnage shipped and the large income received from this fruit, it is now apparent that the smaller fruits are going to play a very important part in the Pacific Northwest in the near future. Prunes and berries of all varieties are going to take their place alongside the apple as an income producer on a big scale, for a new factor has entered the field for the small-fruit man. In addition to his market for the fresh fruit, the small-fruit grower is going to have that of the canner and the juice, jelly and jam producing plant on a scale never before attempted—and it is safe to say that he is going to get a profitable price for his product.

A nation-wide advertising campaign has already created a strong demand for the products of Northwest small fruits, and this advertising campaign will be made even more extensive this year. The opportunity, therefore, is ripe for the fruit grower who may not have made a success in the larger fruits to grow a product that should bring him quick and sure returns.

It will be the aim of Better Fruit to keep the fruit grower informed on this new phase of fruit raising as thoroughly as it has on the orchard fruits. It calls the attention of its readers to a number of special articles in this issue on the subject of small fruits, believing that the opportunity of the small-fruit grower is at hand.

## The Apple Growers' Calendar

Spray well that your fruit will be free of insect pests and other causes that will affect its quality.

Thin that the size of your fruit will make it all marketable.

Prune that you may let in the sunlight and give it the color necessary to place it in the extra fancy class.

Cultivate that you trees may receive the necessary moisture and nourishment to develop and mature their burden of fruit during the growing season.

Irrigate if soil moisture in your district is lacking, but remember that there is such a thing as using too much water.

The value of bees in or near an orchard has been admitted by fruit growers for a long time. A little cooperation between the orchardist and bee keeper therefore ought to result in mutual good.

# Northwest Receives Big Returns on Apples

THE final returns for the 1918 apple crop in the Northwest which are now being completed show that growers generally throughout this district had a very profitable season.

### Hood River Average $1.87

According to the report of Manager A. W. Stone of the Hood River Apple Growers' Association, which was delivered to the growers Saturday, March 8th, the gross returns to the association were the largest in its history, totaling $2,102,900.90. The detailed income from all sources was as follows:

Stores, $290,000; apples, $1,520,000; strawberries, $120,288.42; pears, $106,998.18; cherries, $14,875.75; raspberries, $151.70; loganberries, $77.92; gooseberries, $3; prunes and plums, $9.75; blackberries, $752.13; crabapples, $248.38; quinces, $65.74; ice, $9,500.

The report showed that the pools on all varieties of apples except Newtowns had been closed, and that with the exception of this variety the average price for all grades and sizes was $1.87 per box, the highest received in Hood River since 1911. The final returns on Newtowns, it is expected, will make this average somewhat higher. In his report Mr. Stone digressed from his formal report to pay a high tribute to the local experiment station.

"The experiment station," said Mr. Stone, "is the valley's most valuable institution. This report shows it to have returned the orchardists of this valley thousands of dollars last year. Its permanency will increase its value, and for their recent legislation we owe the legislature a debt of gratitude. I urge on all of you growers to make the fullest use of this institution."

* * * *

### $9,500,000 for Apples at Wenatchee

Practically complete returns have now been received from every grower in the Wenatchee fruit-growing district, including Chelan, Okanogan, Douglas and Grant Counties, for the season of 1918. This report shows that a total of 8,350 cars of apple were produced, besides 1,237 cars of summer fruits, or a total of 9,587 cars. The total gross return to the grower is given as $1.65 per box for apples of all grades and varieties, or a total of $9,500,000 for 6,400,000 boxes. The 1,237 cars of soft fruit returned approximately $2,000,000 to the growers.

The total acreage of bearing orchard in the district, both apples and summer fruit, is shown to be slightly less than 35,000 acres. This indicates an average yield of $325 per acre for every acre of land in fruit in the district, good, bad and indifferent.

By-product factories in the district used 250 cars of apples, 300 cars were shipped to other factories in the state, and the remainder went out as commercial fruit. The total loss from worms was about 8 per cent, instead of from 15 to 25 per cent, as predicted early in the season. About 650 cars of apples remain in the district.

### Yakima Ships Over 10,000 Cars

Fruit shipments out of Yakima passed the 10,000-carload mark during February, when it is estimated that 441 cars left the valley over both the Northern Pacific and O.W. R. & N. Railroads. This is an average of about one car a day better than January, when 415 carloads were shipped out. Records of the total amount of fruit rolled throughout the 1918-1919 season show: November 30, 8,425; December 31, 9,475; January 31, 9,890; February 28 (estimated), 10,301.

### $4 for Yakima Winesaps

On March 12th two carloads of Yakima apples were sold on the regular market for $4 a box. They were 4 and 4½ tier extra fancy Winesaps. This is to date the highest price ever obtained for carload lots of apples in the history of the fruit-growing industry in this valley. Of late the price has been creeping to within hailing distance of the even $4 mark. There are hopes in the breasts of a few holders of the fast diminishing stocks that even $4.50 will be reached. Two weeks ago $3.75 was paid for two carloads of similar fruit, and a couple of cars of extra large, extra fancy brought $3.90.

# Interesting Notes on the Fruit Industry

THE third biennial report of the Department of Agriculture of the State of Washington, just issued, contains an orchard census of the state. This census is taken every two years.

The last report shows a total of 6,617,785 apple trees in the state. Of these 1,904,032 were Winesaps, 1,343,720 were Jonathans, 777,582 were Rome Beauties, 555,064 were Delicious, and 449,426 were Spitz.

The fourth horticultural district, including Chelan, Okanogan, Douglas and Grant Counties, led the state in the number of apple trees with 2,664,047 trees of all varieties. An interesting comparison is found by comparing the orchard census for the Wenatchee district, recently completed by District Horticultural Inspector P. S. Darlington with that of three years ago, which was the last one made.

This shows that the total acreage in fruit in the four Counties of Chelan, Okanogan, Douglas and Grant has decreased from 41,711 in 1915 to 34,815, a loss in total acreage of about 7,000.

The number of apple trees has declined from 2,678,172 in 1915 to 2,288,490 in 1918.

Peach trees have decreased in number from 108,382 in 1915 to 51,977 last year, a loss of over 50 per cent.

* * * *

The Idaho State Horticultural Association at its recent meeting at Boise had 48 boxes of apples contributed by the growers for advertising purposes, for distribution to the newspaper men and the legislature, and to the visiting public to eat. Although 1918 was an off year for the Boise valley and Payette district, yet certain orchards more favorably located secured full crops. J. P. Gray came down from Mesa in the Council district with an exhibit of 28 boxes of apples of remarkably high quality in five varieties. These orchards of 1200 acres just coming into bearing produced about fifty carloads of apples in the year 1918; they also shipped out many carloads of peaches. The outlook for a successful year for the fruit industry in the Payette and Boise valleys is regarded as very favorable this year.

* * * *

Without the slightest congestion in the movement of the Hood River valley apple crop of this year, a tonnage of almost 1100 carloads of fruit was moved to points of distribution with a more noticeable celerity than in the past seven years. Almost 75 per cent of the tonnage of the valley had been shipped by December 20, and nearly 50 per cent of the apples remaining in the big cold-storage plants of the Association had been sold by that date.

* * * *

The first shipment of "Shepard's Fruit Concentrates" will probably be made from the new plant of the Shepard Fruit Products Company at Wenatchee, Washington, within the next few days. After many unexpected delays the factory is finally ready to manufacture apple concentrates in large quantities. The factory will use from 20 to 25 tons of fruit daily. A force of about twenty-five people will be employed during the balance of the season.

* * * *

Complete figures compiled by the Dallas, Oregon, Commercial Club show little planting of apples in the last five years. The prune acreage has increased greatly, however, due to adaptability of the red hill lands to this fruit and to the high prices of the last few years. The Italian prune is the only variety planted.

# The Pear a Coming Fruit for Western Oregon

By M. M. McDonald, President Oregon Nursery Company

THE subject of the pear in Western Oregon is one that is worthy of our best study and investigation, and I believe there are many things we can say about the pear and do with it that will be of vital interest to horticulture.

In the first place, I think it is pretty well understood, and generally admitted, that the pear succeeds as well in Oregon and our Coast country as it does in any other part of the United States, and that we have growing in these Western valleys the greatest varieties of pears of any place in America. Therefore, this country must be well adapted for pear growing, and it follows that the subject should have a place in your deliberations. We have only recently been producing pears in such quantities in these valleys that we have been able to reach the commercial markets of the world; in fact, we have given but little attention to the subject of varieties, production and marketing of pears. It is true that in the Rogue River, and some of the other Southern valleys, they have been growing pears in a commercial way and shipping in carlots, but throughout the state generally, I do not believe the same attention has been given to the pear that has been given to some other fruits.

It is one of the fruits that lends itself well to small acreage. It seems to thrive better in the back-door lot and out in the open than when growing in large orchards; and in these small back-door lots there is growing a great deal of fruit of splendid quality that never reaches the consumer. Our trouble seems to be that no adequate provision has been made for marketing it when grown in a limited way. True, in certain localities where canneries are established, the best of the fruit is taken, but thousands of tons of the most luscious of all fruits is allowed to go to waste every year for the lack of proper marketing facilities. We need better co-operative marketing systems for taking care of the production of the small grower, for every time a ton of pears, for instance, goes to waste there is just so much wealth lost to the community, for it is only when labor receives its just returns for the effort put forth that it can turn the result of that labor into the regular channels of trade and thereby add its part to the wealth of the nation as a whole.

We hear a great deal these days about creating positions agricultural for our boys when they come back from the front. We also hear a great deal about the back-to-the-soil movement for them. But people cannot live by just producing things from the soil. We must create the machinery that will convey these products, when grown, to the market that is hungry for them and return to the producer a fair amount for his labor and interest on his investment. Therefore, it would seem as if we ought to try to create conditions that will allow a man to plant and care for his trees and wait a reasonable time for them to come into bearing. As some of us grow older, we realize that it takes time to produce fruit profitably. In our earlier years, we had an idea that we could plant an orchard this year and next year harvest the crop. As time goes on, I believe we will more and more come to a realization of the fact that the production of tree fruits is a permanent investment that takes years to come to full fruitage—an investment to hand down to our children.

To my mind, we are planting all of our orchard trees too close together. By the time they come into bearing, both roots and tops are interlocking and soil exhaustion has already set in. The pear is a heavy producer under proper conditions and a gross feeder; consequently, when planted close together they soon exhaust the available plant food and are impoverished. If we are going to produce the pear at its best, we must extend the distance between the trees, allowing more soil area for each tree, and by so doing produce larger crops and more money per acre.

In our Western valleys and Coast country, there is none of our tree fruits that gives a surer annual crop than does the pear, and yet it has received but little attention in a general way. What I mean is, there is less information readily available for the use of the average planted than for other fruits. We want to know more about the pear; the best varieties to plant in different soils and different localities; the best kinds to plant for shipping and the best for canning.

It is my opinion that more attention should be given to the subject of canning the pear—that is, from the standpoint of the grower. It is true the canneryman knows all about what he wants from his standpoint. He makes arbitrary rules to protect his own interests without any regard for the interest of the producer or the consumer. To illustrate: Last season we had a very large crop of Bartletts, as fine fruit as ever grew, but on account of climatic conditions the fruit was not as large as usual and a large percentage did not come up to the standard set by the canneries. Consequently, there was no market for this under-sized fruit, fruit that had just as good food values as the larger grade. The average consumer would be just as well served if the smaller size were canned and the producer would realize a profit instead of a loss. Better provision must be made to take care of the small producer in years when there is a surplus and the crop, from climatic conditions, does not come up to the usual standard. If orcharding is to be brought to its highest state of perfection, then fruit must be produced by the small grower, who, with the help of his own family, does all of his own work and harvests his own crop. He needs, and must have, assistance in marketing in a co-operative way. He must be allowed to get fair returns for his labor and investment, and this he cannot do under some of the arbitrary rulings made in regard to grades because he cannot always control conditions surrounding the growing of his crop. If the small grower is to be allowed to survive, we must devise some method that will assure him a market in these off years when for some reason, climatic or otherwise, his crop has run largely below the standard rule established.

### Canned Goods Prices Adjusted.

A final price adjustment covering $12,000,000 worth of canned goods which were released from government reservation some time ago has been decided upon in Washington, according to the announcement of H. Clay Miller, who has just returned after having taken part in the conferences. He says that the price adjustment has been highly satisfactory to the canneries, especially in the matter of tomatoes, which at one time promised to be a burden.

# Soil Treatments for Mature Apple Orchards

By B. S. Pickett, Chief in Pomology of the Illinois Agricultural Experiment Station

ALTHOUGH cultivation is especially beneficial in young orchards, it often produces marked results in old orchards. Orchards which have stood several years in sod, even when they have begun to decline in vigor, are often stimulated to new production by tillage. If the soil is naturally fertile and there is no special local reason for not cultivating, such as danger of washing on steep slopes, cultivation may be expected to stimulate fruiting of the trees.

Cultivation should consist in plowing either in the fall or early spring to a depth of four or five inches at the point farthest from the trees, running somewhat shallower close to the trees; or disking may be substituted for plowing, especially where tractors are used. Plowing should be followed by spring cultivation with disks and harrows to work the ground to a smooth, well-pulverized condition. Two or three successive cultivations sufficiently thorough to keep down weeds and maintain tilth should be given at intervals of about two weeks. Cultivation should cease some time between June 15 and July 1, depending on latitude and local conditions; after which the weeds and natural grass should be allowed to grow unchecked in order to shade the ground and form a cover crop for winter. To facilitate the securing of the crop, this wild growth should be mown just before harvest.

### Mulching

Mulching will successfully take the place of cultivation in bearing orchards, where sufficient suitable material can be brought in to make a covering deep enough to conserve soil moisture and protect the rootlets and root hairs, which work close to the surface of the soil in a mulched orchard and are endangered by intense heat in midsummer. Eight to ten inches of loose straw, waste or damaged hay, leaves, shredded corn stalks, shredded weeds, or other suitable waste materials such as shredded brush, which later will compact to a depth of one and one-half to three inches, will provide a suitable mulch. The grass and weeds already growing in a sod orchard provide some mulching material if, when mown, they are raked under the trees or allowed to lie where they fall. In only rare cases, however, where this growth is unusually heavy, does this mulch provide sufficient covering for the purpose.

Mulching is advised where steepness of slope makes cultivation impracticable; in thin soils, where root growth is close to the surface and it would be seriously injured by cultivation; or where, for various local reasons, the grower prefers to use it instead of cultivation. If a mulching system is to be practiced, precautions against injury from mice and fire must be taken.

### Fertilizing

Neither cultivation nor mulching will render an orchard productive if the soil supplies an inadequate amount of plant food to the trees. It is necessary, therefore, that the fruit grower determine, without delay, whether or not his trees need plant food in order that he may obtain the desired results quickly.

It has been amply demonstrated that nitrogen is usually the controlling element in apple production. If the trees in an orchard are growing rapidly and bearing poorly, the orchard is almost certainly oversupplied with nitrogen. Steps should be taken, therefore, to check the supply by seeding the orchard to grass, thus providing an intercrop which will divert some of the nitrogen that would otherwise go to the trees. On the other hand, if the trees are growing slowly and producing small leaves which yellow or fall early, and are bearing poorly, they are almost certainly inadequately supplied with nitrogen.

A deficiency in nitrogen may be made up in several ways, among the most important of which are, first, the liberation of the unavailable nitrogen present in the organic matter of the soil through the improvement of soil conditions by drainage and cultivation; and, second, the addition of fertilizers carrying nitrogen. Stable manure supplies from 10 to 15 pounds of slowly available nitrogen per ton, depending on its kind, moisture content, amount of litter present, and other conditions. Leguminous green manures supply from 8 to 11 pounds of slowly available nitrogen per ton of green crop. Dried blood supplies from 200 to 280 pounds of quickly available nitrogen per ton. Sulfate of ammonia supplies from 390 to 420 pounds of very quickly available nitrogen per ton. Nitrate of soda supplies from 300 to 320 pounds of immediately available nitrogen per ton.

Of the fertilizers above mentioned, stable manure is especially valuable in building up orchard soils depleted in organic matter and general fertility and in stimulating a rapid growth in young orchards. Leguminous green manures are most useful in orchards where the trees are still small enough to give room for a good growth of the crop used. Like stable manure, they add organic matter to the soil and improve its general fertility.

Among the more strictly commercial fertilizers mentioned, nitrate of soda has come into the widest use for orchard purposes and has sufficiently proved its value in many experimental and commercial orchards to warrant a rather general recommendation of its use in unproductive apple orchards in this state. On this account and because of the widespread interest in its effects, somewhat detailed instructions for its use are given herewith.

### Nitrate of Soda as a Fertilizer for Apple Orchards

Quantity to apply:

Trees to ten years old, growing well, none.

Trees five to ten years old, growing poorly, half to two pounds per tree.

Trees ten to fifteen years old, growing well, none.

Trees ten to fifteen years old, growing poorly, two to three pounds per tree.

Trees fifteen to twenty years old, growing well, none.

Trees fifteen to twenty years old, growing poorly, five to six pounds per tree.

Old trees persistently unproductive, fifteen to twenty pounds per tree.

Old trees declining in productivity, five to ten pounds per tree.

The quantity should vary from year to year, depending on the response obtained, more being used if the trees show a definite but insufficient increase in productiveness, less being used if, after obtaining a definite increase, a

falling, off accompanied by a heavy wood growth, occurs. The orchardist must determine for himself the correct balance between wood growth and fruitage and maintain that balance by withholding or increasing the nitrogen supply as the yearly crop and wood growth indicate.

Time of Application.—Experimenters are agreed that early spring applications are very much more effective than applications at any other time. It is advised that nitrate of soda be applied when the buds begin to show green tips, usually about three or four weeks before the period of full bloom.

How to Apply.—To prepare the fertlizer for distribution, dump it, a sack at a time, into a large, shallow box with a reasonably tight bottom, such as a good wagon box, and crush the large lumps with a cement tamper, a shovel or other handy implement. Load the nitrate into any convenient wagon for conveyance to the trees. Prepare a measure by weighing into a tin can, a bucket, or other receptacle, the required amount and mark the height or cut the can to fit the amount. Spread the nitrogen by hand over all the soil covered by and somewhat beyond the spread of the branches. It is not necessary, however, to apply it closer to the trunk than two feet. Two men, one working from either side of the wagon, will distribute the fertilizer for a large orchard very rapidly.

Caution.—Nitrate of soda is inflammable and should be protected from fire. It should also be kept out of reach of live stock, as its saline taste is attractive, and taken in considerable quantities its effect is poisonous.



## Strawberry Acreage Reduced

Advance figures made by the United States Bureau of Crop Estimates show that the strawberry acreage of the country will be reduced approximately 30 per cent this year. It is expected that only 58,159 acres will be cultivated, whereas 83,139 acres were grown last year and 107,000 acres in 1917. The reduction is general in all the berry growing sections except California, Michigan, New York and Virginia, and none of these shows any decided increase. In the heavy producing states, Louisiana and Tennessee record the greatest cut. Oregon is credited with a slight increase over last year with 445 acres, but it is such a reduction from its 1916 record of 3,184 acres that the industry is nearly abandoned. New Jersey also has fallen from 5,015 acres in 1916 to 3,340 acres last year and to only 24 acres this season .

### BARREL APPLES SELL FOR $10.75

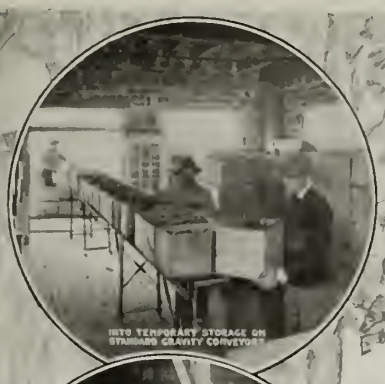
Western New York barrel apples soared to unheard-of prices during the past month. Under the heavy export demand, which has boosted all prices to new levels, sales of Baldwins have been made at $10.75 a barrel, f.o.b. loading station. This stands as the high record price for apples in the Western New York district.

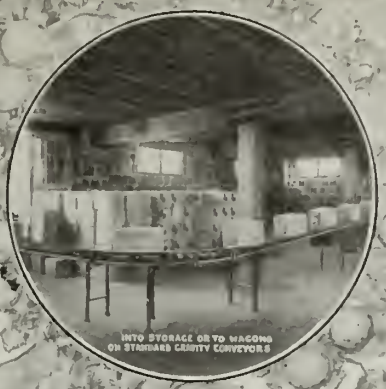
It is a clean $3.75 above the high record for previous years, when in the spring of 1917 a block of Baldwins was sold from storage in Brockport at $7. Some dealers are now asking $11 for fancy lots. The holdings have virtually all passed from the hands of growers with a half-dozen dealers controlling the market now.

### Want Better Apple Boxes.

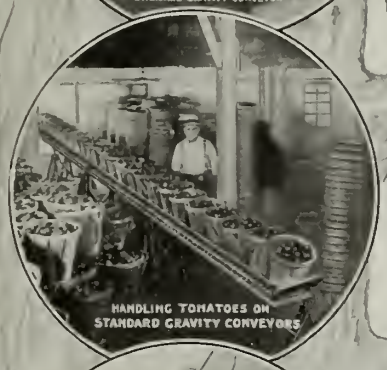
"Better apple boxes" will be the slogan of Wenatchee apple growers this year. Growers not only want the quality of the boxes improved, but will make an effort to have the price standardized. The reason for the movement for better boxes is due to the fact that last year many boxes of apples were reported to have reached their destination affected with blue mold and mildew, due to the damp lumber used in their manufacture.

Mills in the Sound district are now said to be quoting the price of boxes at 15 cents, although a number of contracts for large orders are reported on a basis of 14 cents. It is stated that one contract was recently closed for one million boxes at this price.







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# A New and Effective Disinfectant for Pear Blight

By F. C. Reimer, Talent, Oregon

IT is generally known by pear growers that the only way to eliminate pear blight (Bacillus amylovorus) from an infected tree is to cut out and destroy all the infected parts of the tree. It is also well known that in cutting out and through these infected portions often many blight bacteria are smeared over the tools used in the work. Furthermore, when the final cuts are made in the clean, healthy bark some of the bacteria on the tools again are smeared over the healthy surface. In many cases new infections inadvertently are made in this manner, and the disease continues to spread from the margins of the wound. For this reason a disinfectant should be applied to destroy any bacteria that in this way may have been left on the surface of the wound. The only disinfectant that has been recommended generally and used widely for this purpose is corrosive sublimate (bichloride of mercury). This is a very powerful disinfectant and has been extensively used in the past by medical men.

It often has been noted that where the blight cankers have been removed and corrosive sublimate applied, the disease would continue to develop, especially during favorable weather conditions. This has been attributed generally to a lack of thorough work, leaving some blighted tissue in the margins of the wound. It is certain that this has been responsible for such continued development of pear blight in very many cases.

However, often pear blight would continue to develop from such wounds where the most thorough work possible had been done. For this reason it was suspected that possibly corrosive sublimate was not destroying all of the bacteria left on such wounds. Hence experiments were started in June, 1918, to test the efficacy of corrosive sublimate and other chemicals as disinfectants for pear-blight germs on the wounds of pear trees.

For the first experiment a large number of uniform and very vigorous three-year-old Bartlett pear trees were selected. These were entirely free from pear blight at the time the experiment was started. On the trunk of each tree two large wounds were made by removing the bark and exposing the sapwood over the entire wound. Blight bacteria were then smeared over the surface of each wound, especially over the margins, by which process most of the bacteria were deposited on the cut surface of the margin of each wound. In order to preserve uniformity all of the bacteria utilized were taken from one culture.

Immediately after placing the bacteria the disinfectants were supplied, thoroughly covering the entire wound by means of a new, clean, paint brush. For each disinfectant a separate brush was used.

The following disinfectants were used, treating with two exceptions eight trees, or sixteen wounds, with each disinfectant: (1) Bordeaux paste; (2) corrosive sublimate 1 to 500; (3) cresol 5 per cent; (4) cyanide of mercury 1 to 500; (5) lime sulphur 10 per cent; (6) "Black-leak 40" 5 per cent; (7) chlorozene 1 to 500. Eight trees in which the bacteria were applied to the wounds but no disinfectant was used, were utilized as checks.

The results of this experiment were rather startling. Every wound treated with corrosive sublimate, Bordeaux paste, cresol, lime-sulphur, Black-leaf 40 and chlorozene developed a vigorous case of pear blight. The corrosive sublimate was used twice as strong as is recommended generally for this purpose, and the brand used is manufactured by one of the largest and best known chemical firms in this country. The Bordeaux paste was made by dissolving one pound of bluestone in one gallon of water, and two pounds of lime in one-half gallon of water, and then mixing the two. The cresol used was the liq. cresolis compositus. The lime-sulphur was one of the best known commercial brands and tested 32 de-

grees Baume. Chlorozene is the new disinfectant now used extensively in treating human wounds.

It is well known that corrosive sublimate is a very powerful disinfectant under certain conditions. In pure water cultures it will kill readily most bacteria in a comparatively short time when used at a strength of from 1 to 1000. It has been known for a long time that its value is impaired by organic matter, and especially by albumins. In fact in the presence of large quantities of organic matter it forms inert combinations which reduce, if not totally destroy, its value as a disinfectant.

This probably explains our results with corrosive sublimate as a disinfectant on fresh wounds of pear trees. These wounds are largely polluted by organic matter, and under these conditions corrosive sublimate is not thoroughly effective.

### Results With Cyanide of Mercury

The treatment with cyanide of mercury, in the foregoing experiment, proved very effective. Not a single treated wound developed blight. In this experiment pure cyanide of mercury was used at a strength of 1 to 500 (1 gram of pure cyanide of mercury to 500 grams of water). It is remarkable that in all the other treatments blight developed, whereas in the case of the cyanide of mercury not the slightest indication of the disease could be found. The margins of the wounds showed some injury from the treatment in every case where the cyanide of mercury was used. This injury was confined to a narrow strip of bark around the wound, and was of no special importance, as the cambium soon started to push out from underneath the injured bark and continued to grow out over the wound just as it does in normal wounds where no injury has been produced.

### Cyanide of Mercury at Other Strengths

In the later experiments it has been found that cyanide of mercury is not always effective when used at a strength of 1 to 1000. While some of the wounds on which this strength was used did not develop blight, in a number of cases the disease did develop. Hence, it is not safe to use this material at this weak strength. Experiments will be conducted to determine the weakest strength that will be effective in all cases.

Experiments have been conducted to determine what strength of cyanide of mercury causes injury on the wounds of pear trees. It has been found that a strength of 1 to 300 causes severe injury. For this reason it should not be used stronger than 1 to 500.

### Cyanide of Mercury Not Effective on Tools

Experiments have also been conducted to determine the value of cyanide of mercury as a disinfectant for the metal tools used in blight-control work. The results have been surprising to say the least. A drop of blight ooze was smeared over the blade of a steel knife, which was then im-

mersed in the cyanide of mercury (1 to 500) solution. A cut was then made with this knife through the bark and cambium of a clean, healthy pear branch. This operation was repeated many times, treating the knife with a drop of ooze and immersing it in the disinfectant each time before a new cut was made. In most of the cuts no blight developed, but in a small percentage of cases the disease did develop. It is evident that this disinfectant is not a safe one to use on tools. This is unfortunate but nevertheless true.

Another surprising and remarkable result was obtained with corrosive sublimate (bichloride of mercury) as a disinfectant for metal tools. The above experiment was duplicated, using corrosive sublimate at a strength of 1 to 500 as the disinfectant. Not a single case of blight developed where this material was used.

To summarize: Cyanide of mercury 1 to 500 is effective on the wounds, but not effective on metal tools; and corrosive sublimate is not effective on the wounds but effective on the tools.

It is evident that if the cyanide of mercury is applied to every wound—whether a wound from which blight has been cut or simply a wound made in healthy bark in probing for blight—it will prove effective. In other words, it will destroy blight bacteria left on the surface of the wound by the tools. If the blight cutter wants to disinfect his tools also, and this is preferable, he should use the corrosive sublimate for that purpose; and the cyanide of mercury for the wounds. While this procedure will prove thoroughly effective, the carrying and use of two solutions is cumbersome and not relished by the average blight cutter.

It is evident that another disinfectant should be found which will be effective on both the wounds and the tools. A search is now being made for such a disinfectant.

It is interesting to speculate on why the cyanide of mercury is effective on the wounds but not on the knife, while the opposite is true of the corrosive sublimate. The following suggestions are worth considering in this connection: The cyanide of mercury may form a chemical compound with the metal when placed on tools, which destroys its effectiveness as a disinfectant. Or it may be effective on the wound simply because it modifies the plant tissues—by injury or otherwise—making it impossible for the bacteria to develop and enter the normal tissues beyond. The corrosive sublimate, as has already been discussed, probably becomes ineffective in the presence of the organic matter in the wound. On metal tools, in the absence of organic matter, it is effective.

### A Prominent Disinfectant

In our experiments a number of disinfectants have been tried, and most of them have proved ineffective. With some, unfortunately, not sufficient work has been done to draw final conclusions. One of these appears quite promising and is well worthy of further work. This is formaldehyde, also known as formalin.

Experiments have been conducted to determine the value of formaldehyde as a disinfectant for both the wounds and tools. It was used at strengths of 4, 7 and 10 per cent. In these tests the 4 per cent strength proved effective in all cases as a disinfectant for the tools. The other strengths were not tried on the tools, but undoubtedly the 7 and 10 per cent would be effective.

All of these strengths were tried on the wounds of pear trees. The 4 per cent and 7 per cent strengths proved effective in many cases, but developed blight in a few cases. Hence these strengths cannot be recommended. The 10 per cent strength has proved effective in all these tests; as not a single case of blight has developed where this strength was used. Wounds treated with corrosive sublimate at the same time developed the disease.

These tests with formaldehyde were not started until midsummer, hence the results cannot be considered final. It is well known that a pear tree usually will not blight as readily after midsummer as during the spring and early summer, due to the great amount of sap and more succulent growth early in the season. Next season we shall repeat the experiment at the most critical time, and I reserve final conclusions until that time.

While the findings cannot be considered final, the writer considers formaldehyde as an extremely promising disinfectant for blight-control work. If it proves effective during the most critical

season of the year it will be even more desirable than cyanide of mercury, as it can be used on both wounds and tools. The writer feels that a 10 per cent solution of formaldehyde can be safely recommended for both tools and wounds in blight work during the fall and winter months. The commercial formaldehyde commonly sold by druggists—40 per cent strength—was used in this work. A 10 per cent strength in this discussion means one part of commercial formaldehyde mixed with nine part water. This strength causes noticeable, but immaterial, injury to the margins and surface of the wound.

At this season of the year in his regular blight-control work in the Station orchard, the writer is using 10 per cent formaldehyde for both wound and tools. Next spring and early summer he will use cyanide of mercury on the wounds until experiments have decided whether formaldehyde is effective at that critical season. I must repeat that for wounds alone cyanide of mercury is thoroughly effective at all seasons of the year, and where every wound, cut and scratch made by his tools is disinfected with this material it will prove entirely effective.

These results were regarded of such importance that the work was repeated on Bartlett, Anjou, Howell, Comice, Bosc and Winter Nelis. In one series a bouillon blight culture was used, while in the other series we used the typical blight ooze from badly blighted pear trees. In some of these later experiments the disinfectants were used at the same strengths as in the first experiment, while in others different strengths were tried. The results were almost identical with those in the first experiment. With the exception of a few wounds, on trees making very slow growth, all of those treated with corrosive sublimate, cresol, Bordeaux paste, lime-sulphur and Black-leaf 40, again developed blight. Not a single wound treated with cyanide of mercury has developed the disease.

In all of the earlier experiments pure cyanide of mercury and distilled water was used. The disinfectant was prepared fresh each day, carried in glass receptacles, and applied with a clean paint brush. Two drops of blight culture ooze was applied to each wound to make the test a severe one.

Experiments are now in progress to determine the value of the cyanide of mercury tablets commonly found on the market, the effect, if any, of hard water on their disinfecting quality, and whether the material is impaired when carried in a tin bucket and applied with a sponge. Also to determine the weakest strength of cyanide of mercury that will destroy blight bacteria on the wounds of pear trees.

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The first shipments of Louisiana strawberries commenced to move between March 15th and 20th. The shipments will be made this year for the first time in 24 pint and 24 quart standard crates. The crop of Louisiana berries is estimated this year at 1,000 cars.

# The Fruit Industry of the Pacific Northwest

By C. I. Lewis, Chief, Division of Horticulture, Oregon Agricultural College

THE fruit industry of the Pacific Northwest is just entering a new era of prosperity, a new era of planting. Not for ten years have we planted as we have the past year, or contemplate planting the coming year. It is true that this planting is of a new type. Ten or fifteen years ago we were all planting apples, almost apples exclusively. Today, our planting is very diversified. Italian prunes, Bartlett years, fall pears, berries of all kinds such as strawberries, red raspberries, black caps, evergreen blackberries, loganberries, English walnuts and filberts are being planted in very large quantities. Occasionally also there is an apple plantation and a limited planting of such fruits as the cherry and peach.

The horticultural products plants have been passing through a phenomenal development. In fact, they had developed up to the point where the great crying need of our canneries, evaporators and other plants is for more tonnage—in fact, some of these plants must have more tonnage and more local support or they will have to go out of business. It is encouraging to note that the people as a whole are showing more interest in the possibilities of growing products for our canneries and similar plants. This spring large acreage is being contracted on the basis of one to ten years, which would seem to indicate a rather permanent and healthy situation.

Of course, one cannot talk about the fruit industry of the Pacific Northwest without mentioning the apple, which is our biggest horticultural asset at the present time. It is true that the apple acreage has shrunk considerably, but we must bear in mind that a large percentage of this acreage was of such a character that it never should have been planted in the first place. Acreage which was on poor soil, continued wrong varieties, was neglected from the start, etc., which never would have figured commercially. Although this had a discouraging influence on the industry during the dark days, 1911 to 1915, the Northwest has built an international reputation with certain varieties. This market is established and will continue to demand these varieties which we can grow as no others can produce them. The apple industry is well on its feet. What it needs now is good facilities for growing and handling and avoidance on the part of the growers of agitation or innovations which may question the future of the industry.

The price outlook is good, although no one can predict what may happen in the next few years. It is well to note, though, that without the European market the past few years we have done wonderfully well. European acreage has been greatly reduced and we will certainly find a market in Europe for a large percentage of our tonnage. Many new markets have been developed here at home. All these signs are good and augur well for the future.

As I see it, the Pacific Northwest horticulture has several distinct horticultural problems at the present time. The first one I would state would be to support in a better way the horticultural products plants which we have established. Second, the establishment of a good, generous advertising fund to advertise the fruit and fruit products of the Pacific Northwest. It is true that we have done something along such lines as the "Skookum," "Rosy Apple," "Y Brand," "Loju," "Phez," etc., but these after all are mere drops in the bucket to what the Pacific Northwest should do. We can take a profitable page of experience from California along these lines. Third, we need a campaign of education to bring to the people the real realization of the value of fruit as a food. Not a mere tonic, not something which "take today will keep the doctor away," but we should educate the people up to the real value of our products as food. This we have neglected to do. The fourth problem as I see it at this time, is a co-operative movement to establish steamship lines operated from Pacific Coast points to European and other markets. Thus we would be taking advantage of the Panama Canal, would save expenses in placing our products in foreign markets, and would be able to handle our products to better advantage. This movement must be the result of co-operation between the various lines of horticultural endeavor such as the

apple and pear growers, the dried fruitmen handling prunes, berries, evaporated fruits and vegetables of all kinds and the canneries. If all such organizations would work together it should be possible to establish foreign connections by steamers operating directly from our own ports.

## California Notes

Apricot and prune growers in Santa Clara Valley are reported as being offered prices considerably in advance of last year for their 1919 crop. Apricot growers are said to have been offered $80 a ton for this year's fruit, as against $60 for last year, while 9½ cents a pound is being offered for prunes, as against 6 and 7 cents in 1918.

Of 45,000 fruit trees planted in Merced County in 1918, 20,070 were fig trees of various varieties. The total number now growing in the county is 99,000, of which 29,000 were in bearing last year. Considerable planting has been done in the neighborhood of Tuttle, and more acreage is to be put out there this year. It is expected that figs will lead all varieties of fruit trees to be planted in Merced County again this season. Since importations of figs were cut off by the war about 10,000 acres of fig trees have been planted.

The Oakdale district is finding more room for almond trees. One nursery alone reports the sale of over 40,000 trees in that section. The extent of the new tracts set out varies from five to forty acres.

Eighty-five dollars worth of nuts were sold last year from a 14-year-old walnut tree in the Orange Blossom district in Stanislaus County. The yield was 340 pounds. The same tree, which is owned by George Grundel, last year produced $45 worth of nuts.

## Cull Apple Bill Defeated

The killing of the Gellatly cull apple bill by the Washington State Senate is meeting with the general approval of the fruit growers and shippers of that state. The bill would have allowed Washington growers to have shipped cull apples into state markets unwrapped and in specially marked boxes. The apples must now be sent to the by-products plants. The strongest opposition to the bill developed from the fact that no provision was made as to what was to be done with the fruit after it reached the retailers' hands. On this account it was the opinion of its opponents that the passage of the bill would result in the abrogation of the entire inspection system in the state.

Many of the prominent fruit shipping organizations throughout the state opposed the bill and assisted in defeating it.

# Idaho Horticulturists Have Good Meeting

By E. F. Stephens, Nampa, Idaho

THE meeting of the Idaho Horticulturist Association was interesting and a number of important questions were thoroughly discussed. Among others which were taken up were the report of the Transportation Committee, Joel L. Priest, chairman; "Cooling, Heating and Refrigeration Cars," President Secrist, of the Pacific Fruit Express Company; "Results of Car Shortage in Boise Valley in 1917," J. C. Sewell, Boise; "Results of Car Shortage in Payette," P. M. Smock, Payette; "Cold Air Storage, With Plans for Same," A. W. Hoy, Nampa.

The recommendations of S. H. Bodinghouse, of the United States Bureau of Markets, Washington, were adopted after a full discussion and a committee was named that should meet with delegates from the other Northwestern States with view to a conference which should determine grades and markings that would be agreeable to the box-apple interests of the Northwest. Prof. E. R. Bennett urged the importance of inspection at the shipping point, with a view to giving character and explicit standard of quality to the shipments as packed; believing this would help to give confidence to the purchaser and assist in making sales at standard prices.

C. J. Devies of Yakima, Washington, gave an illustrative lecture, "Modern Methods of Spraying." This helped to give a very clear idea of the insect enemies with which the fruit grower must contend, and the best method of combating it. It was agreed and voted that the summer meeting should be held at Caldwell and the next winter's annual meeting at Payette.

J. H. Maybee of Meridian gave a highly instructive and interesting talk on "Strawberry Culture." After experimenting with seventeen varieties he now grows the Senator Dunlap only. From two and one-half acres he sold something over $1700 worth of fruit. He fruits his plantations three seasons then renews. Plants growing from renewal are selected from special plants grown for the purpose and not allowed to fruit during the first season of growth.

In the discussion of insecticides the trend of opinion at the meeting was in favor of liquid lime and sulphur. Competing manufacturing firms brought in samples of arsenate of lead which were tested out as to suspension and covering quality.

In the program the address of welcome by Mayor Hayes was set for Thursday evening. In his response in behalf of the society Hon. Silas Wilson of Nampa mentioned that he had charge of the Iowa exhibit of fruit at St. Louis in 1904.

Among all the states exhibiting at St. Louis, Idaho had the best fruit in size, color and quality. This determined Mr. Wilson, then a resident of Atlantic, Iowa, to visit and investigate a district which could grow apples of such superior quality. Expending several months in his investigation he finally decided to locate at Nampa, Idaho, and purchase lands now known as the Wilson Orchard Company, consisting of 640 acres in orchard at Nampa and Kuna. At a later period Mr. Wilson decided to make an exhibit of fruit in competition for the Wilder medal offered by the American Pomological Society, thirteen varieties of winter apples were selected, 264 apples carefully packed in three boxes. This fruit was declared to be the best exhibited and received the much coveted Wilder medal, which Mr. Wilson had with him and exhibited to the meeting.

Attention was called to a peculiarity in the present law, under which poisons and insecticides must be sold in the original packages under serious penalty of law. Unfortunately this precludes the subdivision of 200-pound packages of the dry arsenate of lead and weighing out into four or five-pound packages the proper amount for 200 gallons, the usual tank full. The difference between the price in 200-pound packages and in the smaller packages varies from five to ten cents and prevents the dealer from subdividing his 200-pound packages and supplying his customer who needs a little at the lowest price.

In the discussion of prospective car supplies Joel Priest stated that while shipments of hay had increased from 5610 cars in 1917 to 11,000 in 1918 and there had been an increase in shipments of potatoes amounting to over 2000 cars, yet the railroad companies had been able to supply all cars needed.

In the discussion of freight rates it was shown by George Way that Idaho shippers were at a disadvantage in reaching the Middle West. The Eastern shippers have a far better freight rate on Western shipments than the Idaho shipper on Eastern shipments for equal distances. This inequality presents work to our Utilities Commission.

Committee on Memorial reported the death of Robert Milliken of Nampa, the first secretary of the Idaho Horticultural Society, and at one time a teacher of horticulture at Manhattan, Kansas. Mention was made of E. H. Shephard, widely known as editor of BETTER FRUIT, recently deceased.

Prof. E. D. Ball of Ames, Iowa, who was to appear on the first day, wrote a letter stating that it was impossible for him to attend but presented a discussion of the essential surrounding successful work, of which the keynote was thoroughness of application.

Mr. V. S. Peet, General Agent of the U. P. Railway, presented a lot of in-

teresting statements in defense of the railroad policy. In this discussion Mr. Peet stated that one-sixteenth of the population of the United States resided in New York, one-fifth of all our people lived in cities containing more than 300,000 population. The urban population was increasing much faster than the producers of food, and that intelligent application in the production of food products should bring steadily increasing profit. Mr. Peet made mention of a family residing near Boise which is cultivating twenty acres and sold over $2000 worth of farm products. Mr. Peet stated that the Union Pacific and Oregon Short Line would soon publish a free bulletin which would be a compendium of useful information.

Mr. Ornsby was asked to address the society on the merits of the Hammond Evaporator and Dehydration Process, and said that a plant large enough to handle 25 tons of fruit and vegetables daily would cost about $50,000.

Mr. S. W. Foster of San Francisco was delayed in reaching the meeting, but arrived in time to discuss the "Season Sprays" Saturday morning. "Spraying as an Asset and Liability" was also discussed by Frank E. Seeley of Payette, and Prof. C. C. Vincent of Moscow, Idaho, sent in a letter giving the result of his experiments with different insecticides.

The present board of officers and directors were re-elected for the coming year. The meeting adjourned and separated in the feeling that the sessions had been unusally interesting and profiitable.

### BUREAU OF MARKETS SAFE

It is announced in Washington that little concern is felt in the Bureau of Markets over the failure of Congress to pass the agriculture appropriations bill for the fiscal year beginning July 1.

The bureau has sufficient funds to carry on its work until that time. It is expected that an extra session of Congress will have been called, and in all probability the agriculture bill will be passed before July 1. In the event that there is no session of Congress or if the bill is not passed by that time, some of the work of the bureau will be curtailed, but it is stated even in that event the work which would be carried on could be done on a monthly payment basis.

The appropriation asked for by the bureau for the coming fiscal year is $2,689,365. More than half of this sum is for the enforcement of the Standard Grain Act.

### BIG MONEY FOR BEN DAVIS

Some idea of the demand for apples in the Eastern markets may be obtained from the fact that a large pie company recently closed a contract with a New York commission house for 100,000 pounds of Ben Davis apples at 5 cents per pound, equivalent to about $2.50 per box. The pie company had a contract with the Government to furnish 5,000 pies daily.

## Pinched Feet Bad for Trees

By F. W. Wilson.

Dynamite isn't a commodity that a woman ordinarily enthuses over, but Mary Jane Gregory of Westminster, Colorado, has found something to commend itself to her in the big bang stuff.

She had a number of four-year-old fruit trees on her place and was anxious to have them grow uniformly, but this spring one of them showed no signs of life. A neighbor was appealed to for advice. His opinion was that the tree was root-bound by the compact prairie soil in which it was growing. This man happened to be familiar with the use of dynamite and suggested as a remedy for the trouble that a bore hole be put down in the ground about three feet from the trunk of the tree and loaded with a small charge of the explosive.

Mrs. Gregory in speaking of the result of the experiment says:

"This shot loosened the soil about the tree and a week or two later, it began to leaf out and a few weeks later, was ahead of the other trees."

When a man's feet are pinched by shoes too tight for him, he can easily get a larger pair of shoes, but when a tree's feet are pinched by too tight a soil, its plight is serious. Poor circulation is as bad for a tree as for a man. The roots are not only the feet of the tree, but its stomach as well. Impervious, tight soil around the roots, therefore, means more than merely sore feet; it means starvation as well.

If dynamite will relieve trees of troubles such as Mrs. Gregory describes, her neighbor is entitled to the gratitude of tree lovers for suggesting a practical remedy.

### ADOPTS STANDARD FOR BOXES

At a meeting held Monday, February 24th, the Yakima Valley Traffic & Credit Association adopted the following specifications as the standard for apple and pear boxes for the season of 1919:

PINE BOXES

| | |
|---|---|
| Ends | ¾ x 10½ x 11½ |
| Sides | 5/16 x 10½ x 19½ |
| T. & B. | 5/16 x 5½ x 19½ |
| Cleats | ⅜ x ¾ x 11½ |

SPRUCE BOXES

| | |
|---|---|
| Ends | 13/16 x 10½ x 11½ |
| Sides | 5/16 x 10½ x 19⅝ |
| T. & B. | 5/16 x 5½ x 19⅝ |
| Cleats | ⅜ x ¾ x 11½ |

One-piece sides, two-piece tops and bottoms, no knots in ends that will interfere with nailing. No objections to two-piece ends if well stapled with smooth joints. Tops and bottoms to be free from pin knots. Pear boxes same as above except two inches less in depth.

### ORCHARDISTS BUY MANY CARS

Motor-car dealers at Hood River report the sale of 148 new machines during 1918 and say that the sales would have been much larger had they been able to secure more cars. The total purchase price for the new cars reached $126,590. Orchardists at Hood River say that they find the motor car and truck invaluable in handling fruit.

# Future Fruit Outlook Most Encouraging

By C. C. Hutchins, Secretary White Salmon Commercial Club

THE fruit growers of the White Salmon Valley believe that the fruit business has "come back," and back to remain. This applies not only to the apple but the pear and other orchard fruits. A general feeling of optimism prevails, and encouragement to give their orchards even closer attention from now on. It has been a hard struggle in this and all orchard sections to hring properties to the point of commercial bearing, and to the point where a profit over expenses might be enjoyed. The past season's market has not only covered the cost of production but in most cases returned a very satisfactory margin of profit. That a certain degree of prosperity prevails in the district is evidenced by the Columbia State Bank of White Salmon having the largest deposits in its history. The large orchard of the Mt. Adams Orchard Company, in the Gilmer district, coming into commercial bearing for the first time this past season, shipped out in apples and pears over $25,000 gross; with a handicap of a fifteen-mile haul to the shipping point and a number of quite extensive improvements, including a large storage building and spraying machinery, they netted several thousand dollars, according to their field manager, Homer Green. So encouraged were the stockholders of this corporation, they voted at their recent annual meeting to increase the acreage of pears, putting in the Bosc, and to make a number of substantial improvements, including probably a cold-storage plant for the precooling of their pears.

The outlook for the future of our orchard fruits seems most bright. As far as the pear is concerned, it will probably always command a price which will net the grower a good profit. The Eastern pear orchards have suffered greatly from the blight, to such an extent that the majority of them are no longer a factor in the market. The East must look to this Pacific Coast for its pears. The apple does not, however, hold this position, for throughout the East and Middle West are large producing sections; it is up to the growers and associations of the Northwest to keep a lap ahead of those sections in their quality of fruit and pack. During the past four years thousands of acres of orchard throughout the United States have been sadly neglected; many of them beyond recovery. This has been caused by the low prices prevailing for several years; almost prohibitive overhead cost in the way of labor, team keep and hire, box and other materials. Many of our orchards, too many, are owned by non-residents who are un-

able to do any personal work on their property, thus helping to keep down the cost, but during the past three or four years, in many cases, have permitted them to go practically uncared for. It would be interesting to know how many thousands of apple trees have been pulled out of the ground to be replaced with some other crop. This step may be a repetition of the prune business a few years ago, and before long be a cause of regret to those who failed to keep them in the ground. There were a few years ago thousands of acres throughout the Northwest set to orchards and sold to Easterners that have never been cared for; were set on soil unsuited for orchard development, and which have gone back to the brush or sage brush; they never will become factors in the apple market, and these

thousands of acres helped wonderfully a few years ago in creating the "overproduction" bugaboo. Word has come several times from overseas that thousands of apple trees have been blown out of the ground or maliciously destroyed by the Huns. During the duration of the war but few apples were exported; the people "over there" are fruit hungry; more than ever will they get the fruit-eating habit, and it will stay by them. The close of the war has given this country greatly broadened markets, as well as its own merchant marine to deliver the exports. Therefore it would seem the orchardist who has a well-cared-for property, well set with standard varieties, in a proven fruit district, has every encouragement to stay with it strong and to expect satisfactory returns on his investment, on the average, for there will always be off years in every commodity produced. Many problems of marketing are yet to be worked out, but they will be in the course of time. One of the most important details related to the success of the fruit business, and particularly that of the apple, viz., putting up a square pack, true to the markings on the outside of the box, is up to the grower himself; he may fool himself, but he cannot fool the middleman and consequent consumer; the middleman will likely have a very good memory and bear in mind the district permitting the shipment of misbranded fruit, also the name of the grower himself who attempted to camouflage his pack. Quality apples, absolutely true to grade markings, will put the district producing same on the map and bring top-notch returns.

### Currant Maggot

The larvæ of this fly are in the ground and the best way to control is to dig over and stir the ground thoroughly under and around the bushes now and then late in March. This may be effective enough to save your gooseberries and currants from containing maggots next spring. There seems to be no other way yet of dealing with this creature.

# PLANT A VICTORY FRUIT GARDEN

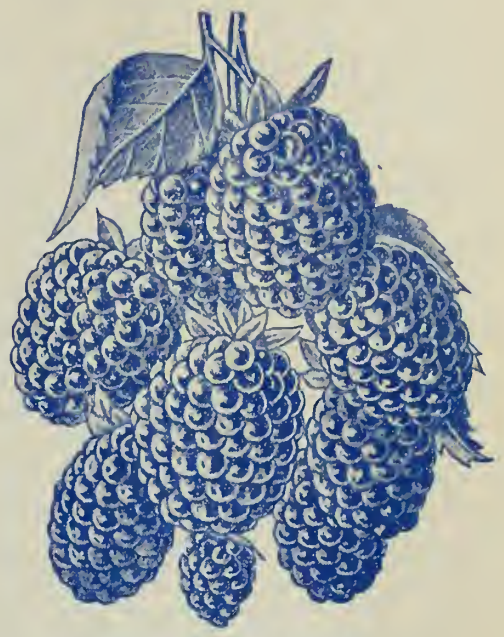
## Have Your Own Fruit Next Summer

We will send you postpaid ten Pure-bred Pedigree Fruit Plants, with complete instructions for planting. These plants will be furnished by the Portland Seed Company, one of the old reliable seed companies of the Pacific Northwest. They have been selected from strains that for generations have produced an immense crop of quality fruit. They are specially adapted to the Pacific Northwest climate and will be sent to you at the right time for planting in your particular section of the country.

Let the idle space in your backyard or garden produce luscious ripe Raspberries, Blackcaps, Dewberries and Blackberries. Nothing is more delicious than fresh ripe fruit picked every morning while the dew is still on the vines. Berries that you buy in the stores are usually shipped from a distance, which means that they are picked before they are ripe. Fruit that ripens naturally on the vine tastes different, infinitely better—and you can grow it in your own garden. We have selected for you a collection of five of the best small fruits, We want to send you two of each, ten in all. This will give you enough plants for a splendid home berry garden.

THE COLLECTION CONSISTS OF

2 Improved Lucretia Dewberry  2 Cuthbert Raspberry  2 Eldorado Blackberry
2 Cumberland Blackcap  2 St. Regis Everbearing Raspberry



Improved Lucretia Dewberry

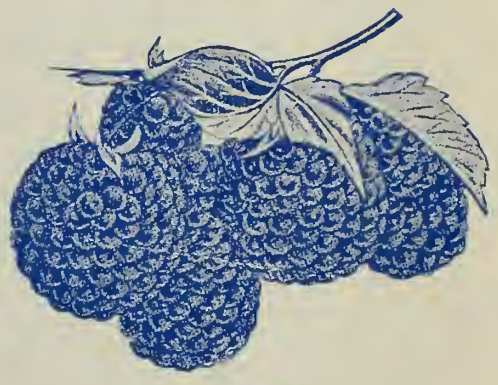
Eldorado Blackberry

## OUR OFFER

Western Farmer, one year
Better Fruit, one year
and
Victory Fruit Collection
} All for **1.75**

## Plants Sent Postpaid at Proper Planting Season

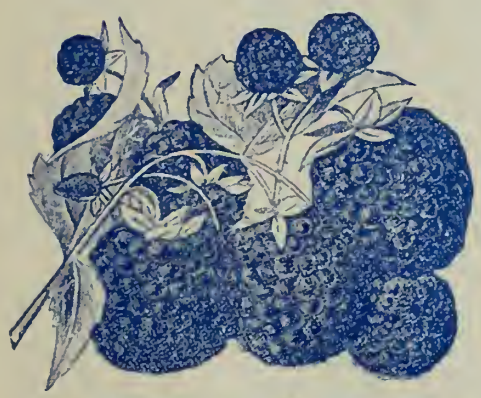
We will ship your plants at the proper planting season for your locality. These plants are exceedingly hardy and do not freeze easily, but we will hold them in our storehouse until such time they can be shipped with safety. This will depend upon whether the season is early or late, but you will be sure to get your collection at the proper time for planting.



Cuthbert Raspberry

## Make Your Planting This Spring and Pick Ripe Fruit Next Summer

**These Ten Fruit Plants** have been selected from strains that, for generations, have produced immense crops of quality fruits. They are hardy and will grow successfully anywhere in the United States, and will not winter-kill. These plants will provide you with fresh fruit all season, and each year will produce profusely new shoots which can be transplanted successfully.



St. Regis Everbearing Red Raspberry

## DESCRIPTION OF VARIETIES IN OUR COLLECTION

### Improved Lucretia Dewberry

The berries, which are borne in heavy clusters, measures an inch through, and an inch and a quarter long. Incomparably sweet and juicy when fully ripe, and has but few, very fine seeds. By nature a creeper, the vine should be trellised. The large white blossoms are very attractive.

### Cuthbert Raspberry

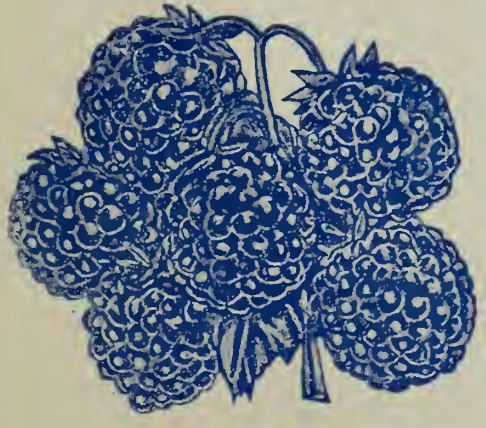
Large berries, of wonderfully sweet flavor, are borne in heavy profusion. The Cuthbert sets all its fruit at one time, and ripens it altogether. One or two pickings will usually gather the entire crop. On this account, as well as its quality, it is the favorite commercial raspberry.

### Eldorado Blackberry

Handsome in appearance and as beautiful in quality, the Eldorado has no peer among the blackberries. The canes grow rank and tall, and are literally covered with immense clusters of shining blackberries. For eating fresh, for pies, preserves, jellies or jam, the Eldorado is superb.

### St. Regis Everbearing Raspberry

The St. Regis begins to bear before any of the other raspberries and continues after all others have quit. The fruit is of medium size and of very good quality. On account of the long season the vines yield immensely. You will secure a good picking every week from June to October.



Cumberland Blackcap

### Cumberland Blackcap

No collection of small fruit plants would be complete without the grand old Cumberland. The fruit is large, firm, of good flavor, and is borne in large clusters that ripen very evenly. The canes grow large and strong, enabling them to ripen tremendous crops of fine berries.

## DON'T DELAY

This offer is good for 30 days from date only. You cannot secure plants of better quality or plants that will bear more quickly after planting. We guarantee the collection to reach you in good condition and to grow satisfactorily.

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Gentlemen: Enclosed find $1.75 for which enter my subscription one year each for Western Farmer and Better Fruit. Also send me at the proper planting time your Home Berry Collection.

Name .....

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Note: If you are already a subscriber to Western Farmer or Better Fruit, your subscription will be extended from expiration for one year. Remember this offer is good for 30 days only.